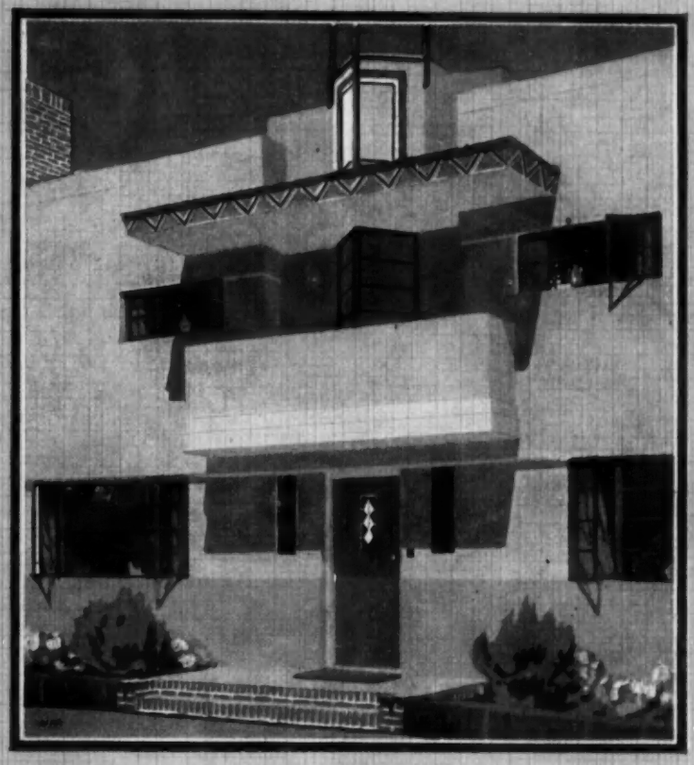
AUG 9 1930

THE ARCHITECTURAL FORUM



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BOOK DEPARTMENT

THE SPLENDOR OF FRENCH GOTHIC ARCHITECTURE

A REVIEW BY

CLIFFORD WAYNE SPENCER

THE combination of subject, author and artist brought together in creating this work has produced a volume of the greatest charm and interest. The subject, covering as it does the great cathedrals and churches for which France is so justly famed, is, of course, beyond compare, and the descriptions which Mrs. Arms has written of them are equaled only by the manner in which Mr. Arms has portrayed the buildings and their surroundings with his needle, pen, pencil and brush.

The reader is taken on a leisurely and well conducted tour through some of the most interesting regions of France as a personal guest of Mr. and Mrs. Arms and is allowed to share in the little incidents that make such a trip enjoyable. He is also given the benefit of their unusual understanding of the French people, their inherent characteristics, and their customs, acquired as a result of much time spent in traveling and living among them. It is this personal viewpoint that makes the descriptions vital and interesting, giving the reader, no matter how much he may have traveled himself, a new appreciation of the great masterpieces of French Gothic architecture as well as of the social and racial characteristics of which they are an expression. The etchings and sketches of cathedrals and churches with which the volume is illustrated by Mr. Arms, who is one of the leading etchers of the day, are wholly pleasing and show us many familiar buildings from new points of view. The fact that Mr. Arms was formerly an architect is quite evident, since the architectural quality in the drawings is unmistakable. Some of the pencil drawings might be said to be a little hard and mechanical from a strictly artistic viewpoint, and the reproductions of pencil drawings are, in some cases, so faint as to be almost indistinct. The way in which these drawings portray architectural detail, however, compensates for any lack of effectiveness in other ways. In the case of the etchings very little remains to be desired, and they show a true artist's feeling for pleasing composition and atmospheric quality. The one or two aquatints which are included are also pleasing. Perhaps the most striking thing about the illustrations is the success the artist has had in presenting the amazing amount of detail which forms so important a feature of French Gothic architecture. In the drawings every stone carving or tracery seems to be faithfully portrayed, and there are several close-up studies of interesting details of some of the more important buildings. Another feature of the drawings that makes them outstanding is the way in which Mr. Arms has shown them in connection with interesting bits of their surroundings. He seems to have carefully sought out points from which to make his drawings so that some quaint winding street or interesting mass of mediæval dwellings forms the foreground above which soar cathedral or church towers.

The accompanying text descriptions are written in a delightfully informal and intimate manner that makes the reader feel that he has known and loved these great buildings a long time, even though he may never have seen them. This is no mere description of architectural perfections, but is rather a highly impressionistic group of sketches, seen against a background of past and present events, and under the various moods and lighting effects that were most impressive to the author. Whether it is a description of the great towers of Notre Dame, seen as an omen of hope when the city was terrified by the presence of an ever-rising flood of the Seine, or of the setting sun as seen from Mont St. Michel, there is a clear expression of the spiritual feeling with which the author is filled when in the presence of these old structures. As Mrs. Arms says in the foreword, "every country has a special message for each one of us, and there is no standardizing them, nor need of it. When I write of France it is from a personal viewpoint, based on our own experiences and on our own reactions to them. At one end of the scale is the pure exquisiteness of Gothic architecture carried to unbelievable beauty, and at the other end the little, simple contacts and incidents of everyday life. The extremes and all the intermediate points make up the full richness and flavor of the whole. Each new episode adds its spice or aroma, and each new revealing of individual or national characteristics adds the mellowness of deepened sympathy." It is the charming way in which Mrs. Arms has expressed her personal impressions of France and its great spiritual centers that make these sketches so effective.

To the reviewer it is not quite clear whether all the drawings and text descriptions in the book were made on the same trip through France. At any rate, it is evident that the understanding underlying them was acquired over a considerable period of time spent in travel and living among the French people. Perhaps the book is a composite of several trips made by Mr. and Mrs. Arms. It is, however, presented in the form of a single excursion, starting from Paris where Notre Dame is visited under various conditions and moods and which Mr. Arms has sketched from an unusual vantage point across the Seine. We are also conducted up the well worn spiral stairway to the upper gallery of the towers and given a close-up view of the famous grotesques which adorn the ramparts as well as a view

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College Architecture in America

Its Part in the Development of the Campus

By

CHARLES Z. KLAUDER *and* HERBERT C. WISE

Music Building, Smith College
Delano & Aldrich, Architects

A NEW and ever higher standard is being established for the architecture of educational structures of all kinds. Some of the most beautiful buildings in all America are those venerable halls in academic groves in Charlottesville, Cambridge, Princeton and elsewhere built by early American architects, and now after long decades of indifferent designing and careless planning American architects are rising anew to the situation and are designing educational buildings of every type which closely rival even the best work of a century ago, while in planning and equipment they establish a standard which is wholly new.

¶ In this valuable and important work two widely known architects of educational buildings collaborate in reviewing the entire situation as it applies to college and collegiate architecture. They have carefully studied practically every important institution in the country, and in their text they discuss administration buildings; dormitories; recitation halls; chapels and auditoriums; gymnasiums; libraries; and structures intended for certain definite and specific purposes, such as the teaching of music, all this being well illustrated with views of existing buildings and in many instances with floor plans and other drawings. A valuable and extremely practical work to add to the equipment of any architect's office.

301 Pages, 7½ x 10 Ins.
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THE ARCHITECTURAL FORUM
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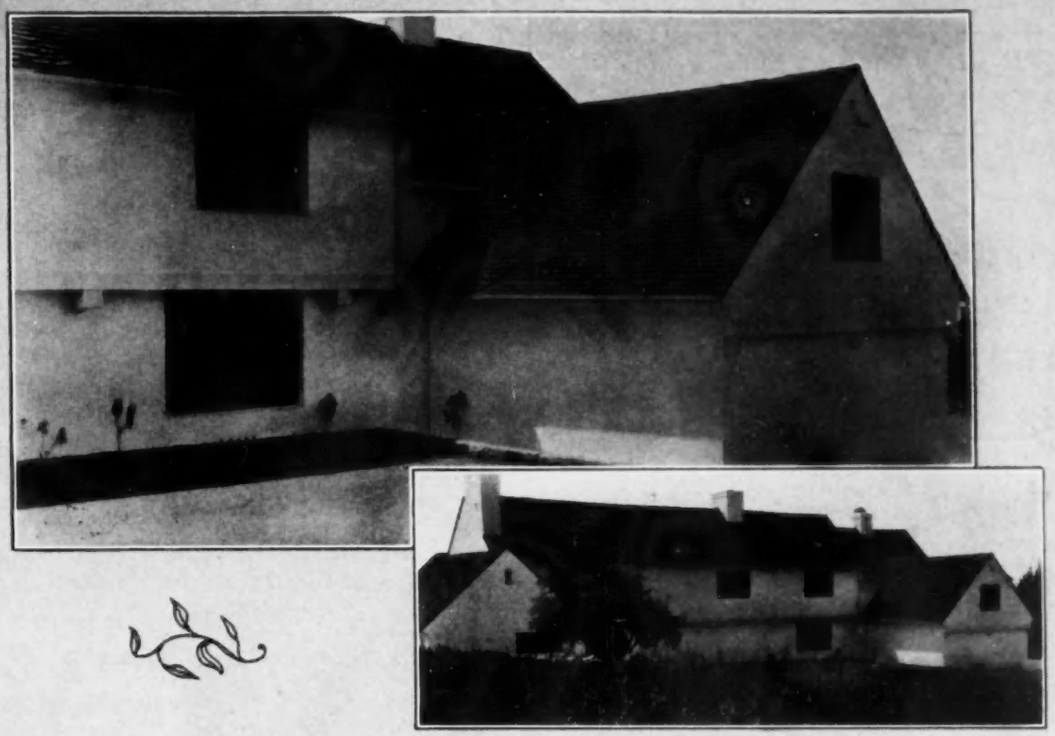
looking out over Paris. Mr. Arms also presents several studies of the gargoyles as seen from the galleries and another interesting view of the towers as seen from St. Julien le Pauvre. St. Germain L'Auxerrois with its historic background furnishes the subject for another charming word picture by Mrs. Arms. At Abbeville the cathedral of St. Vulfran is shown in an etching, but the reader's attention is focused perhaps more on the surrounding town than on the cathedral, both by the drawing itself and by Mrs. Arms' description. Here both the artist and the author were evidently much more interested in the charming mediæval dwellings of the town than by the cathedral, beautiful though it is. Quite the contrary was found to be the case at Amiens where the strikingly beautiful cathedral is set down amid a rather ugly modern town. Mr. Arms, however, has chosen to make his sketch from the lower town which furnishes an excellent foreground for the soaring structure. For her part, Mrs. Arms, in addition to describing the beauty of the cathedral, has given us an amusing and highly colored narrative of a boat trip among the so-called "floating gardens" in a leaky boat. Beauvais was found to be noteworthy mainly for the size and grandeur of its cathedral, built on far too grand and yet fragile scale to be structurally sound. The account given by Mrs. Arms of the building and the collapse of the beautiful lantern of Jean Vast is an interesting commentary on the ecclesiastical ambition and religious fervor that made possible the construction of such tremendous monuments. The cathedral of Bayeaux is seen against its rich historical background centering in the period of William the Conqueror. The cathedral itself is presented in one of Mr. Arms' pencil drawings, noteworthy for its exact portrayal of intricate architectural detail. Mrs. Arms also contributes a description of the celebration of the Feast of the Assumption which happened to be taking place at the time of their visit. Judging from the account it must have been a very colorful procession indeed.

At Coutances the etching shows a winding street lined by fine old houses with the towers of both Notre Dame and St. Pierre in the distance, the former being an admirable example of pure Norman Gothic. The bell tower of the church of St. Catherine forms the center of interest as well as the actual center of the old town of Honfleur. This tower is located, strangely enough, on the opposite side of the "place" from the main structure of the church, and its primitive construction and great antiquity provide a mellow note as compared with the other buildings shown in this volume, most of which are examples of the highest development in Gothic architecture. The base sprawls out pleasantly to form living quarters for the bell ringer, and the "place" is the scene of the throbbing activity of the town, for it is crowded with the stalls of the market where the women bargain for meat, vegetables, or fruit, while the men busy themselves or sit about the water front, from whence, in 1608, sailed Samuel Champlain to found the city of Quebec. In the nearby town of Pont L'Eveque these travelers discovered the little-known church of St. Michel, ruggedly built in the strong Norman manner, its original structural beauty being quite apparent in spite of the later addition of flamboyant decorations. From among a great number of tempting



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236 Pages; 7½ x 10¾ Inches. Price $15

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subjects for sketches and descriptions, with which this section of France abounds, the authors have chosen Caudebec en Caux because of its gay, appealing personality and the elaborate delicacy of its church tower. Mr. Arms has taken advantage of the opportunity to set down the enormous amount of elaborate detail afforded by the church spires, but the faintness of the reproduction makes the study of this detail a trifle difficult.

There is nothing indistinct, however, about Mrs. Arms' word painting of the busy town on the banks of the Seine which plays such an important part in the lives of its people. The beauty of the church itself, culminating in the jewel-like tower, is fittingly described, and some of the important historical events that have here transpired lend a colorful background. In the words of Mrs. Arms, "the kings and emperors of France are gone, and Caudebec is a pleasant, bustling town where tourists and artists abound and where everyone is very busy about his own affairs. But every stone is storied, each street has a history, and the river is pure romance."

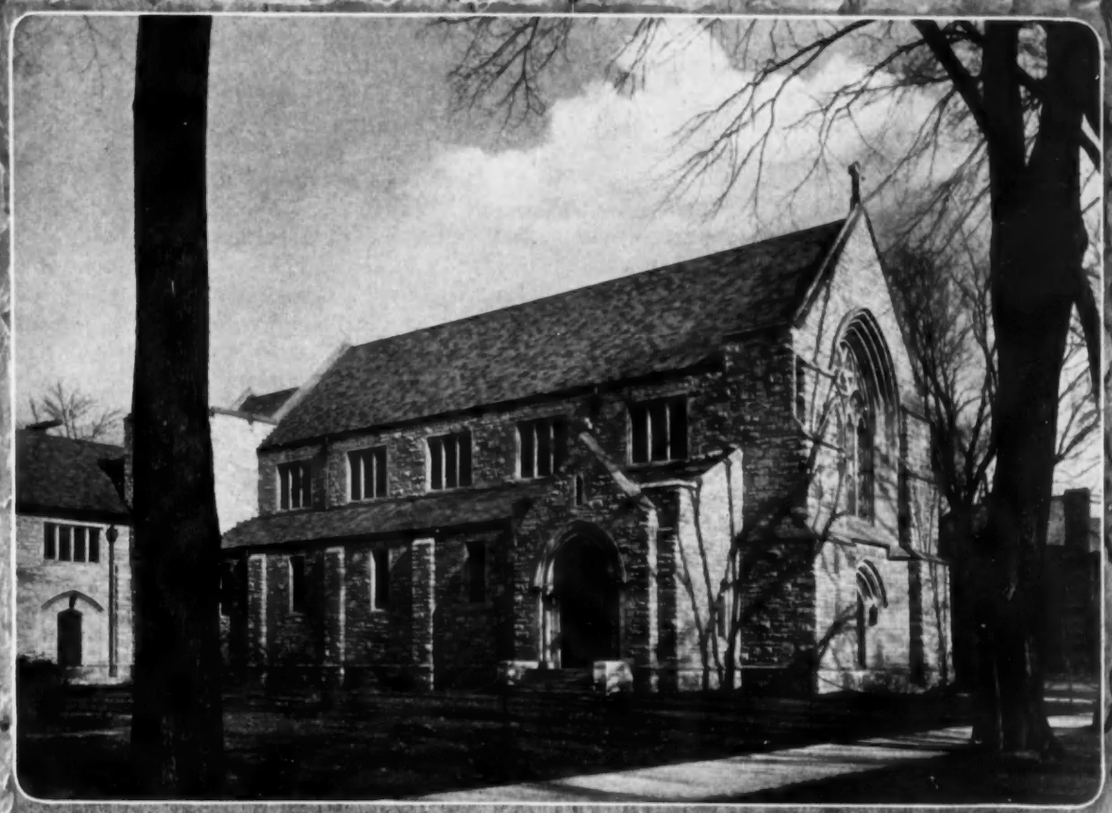
Rouen with its exquisitely beautiful churches furnishes both the artist and the writer with an abundance of material of just the sort in which they seem to delight. And so the journey is continued from town to town with plenty of time to search out the best and with plenty of understanding to know what is the best. The mystical isle of Mont St. Michel is visited and carefully examined, and always there are amusing and enlightening incidents to make the trip more enjoyable.

CHURCHES OF FRANCE. Text by Dorothy Noyes Arms with 51 reproductions of etchings and drawings by John Taylor Arms. 9 x 11½ ins. Price $20. The Macmillan Company, 60 Fifth Avenue, New York.

THE STADIUM. By Myron W. Serby, Consulting Engineer. 64 pages, 6 x 9, cloth. Illustrated. Price, $1.50. American Institute of Steel Construction, Inc., 200 Madison Avenue, New York.

THE stadium has become an important element of collegiate, high school and municipal architecture, as well as of amateur and professional athletics. Since the first important stadia were built in this country, very valuable data and experiences have been collected which serve as a dependable guide in the promotion, designing, construction and operation of such structures. It is evident that many collateral factors are as important in the success of a stadium as its design and construction.

This work of Mr. Serby's treats of every factor from the inception of the stadium project to its completion, operation and maintenance. The design phase is adequately covered by the field dimensions necessary for the various sports and by illustrations from photographs, by diagrams and design tables. The accessories required for the athletes, officials and the public are described,—briefly, it is true, but with such a degree of completeness that it covers all of the fundamental principles involved. There is no lost motion in this volume to waste the reader's time or distract his attention. It is indexed and contains a very complete bibliography, 1914-1929. "The Stadium" is not only a readable book but a *work* book as well. It should find a ready acceptance among architects and engineers and also among athletic coaches and the authorities of any school, municipality or college that may now possess or contemplate the construction and the maintenance of a stadium.



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Coolidge & Hodgdon
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THROUGH numberless sources we are made conscious of the increasing realization of the importance of the relationship between the proper display and the sale of merchandise. Attracting the attention, holding that attention and consummating a sale form the process of merchandising which is initiated by its display. The succeeding steps must be taken with the maximum comfort and convenience to the buyer. The initial display is made largely in the show window, and its importance is recognized by all successful merchants.

These displays include the important elements of structure which afford protection to and the visibility of the merchandise as a function of architecture, and suitable settings for and arrangement of merchandise as functions of stagecraft. The correct coördination of both are essential to success. The field of window display invites the serious attention of architects who design commercial buildings, and to design them successfully they must have a comprehensive knowledge of their own function as well as a keen appreciation of stagecraft.

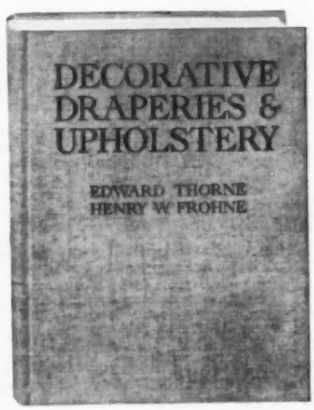
In this book Mr. Kiesler has advanced his ideas and explained their practical application to modern window displays. While some of them may at first appear to be unreasonably intricate and expensive, they are not so in fact because the elements of cost have been carefully considered by the author, whose observations and experience entitle him to speak with a degree of authority. Whether or not the architect and the merchant adopt the specific methods described and illustrated, the study of them cannot help but stimulate them to attain better results in devising facilities and methods for the display of all the various kinds of merchandise to purchasers.

The author has adopted the extreme "moderne" methods of book makeup which will distract many readers. He evidently does not appreciate the real difference between holding the concentrated attention of the serious reader and merely attracting a perhaps superficial interest. It is a question as to how far stagecraft can be applied successfully to book making without obscuring its ultimate objective and without defeating its principal aim.

Instead of jumping into the main subject at once, the author has introduced a long discussion of contemporary "art" with illustrations among others of a shapeless woman by Matisse and an alleged representation of "The Guitarist" by Picasso. We must concede, however, the right of the artist, along with that of parents, to identify their offspring with names of their own choosing. By introducing his architectural "manifesto" of April, 1925, entitled "Horizontalism Is the Forerunner of the Coming Tensionism," the author further complicates his major subject with his anomalous "horizontal skyscraper" and adds an element of humor comparable with that Bavarian beer putsch manifesto of happy memory. Architecture is a manifestation of social and economic conditions and not influenced by "manifestoes."

The book is worth while to those interested in planning spaces for and in the display of merchandise.

CONTEMPORARY ART APPLIED TO THE STORE AND ITS DISPLAY. By Frederick Kiesler. 158 pages, 8 x 11, cloth, illustrated. $7.50. Brentano's, 1 West 47th Street, New York.



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By Edward Thorne and Henry W. Frohne

THIS book is a veritable mine of decorative ideas with its illustrations in full color. It covers every item in the decorating of the home or apartment, and includes ideas for the office, hotel, or country club. The proper relationship between furniture draperies, floor coverings, wall treatments, etc., are shown in the full-page plates in actual color for every room in the house. These plates illustrate the best work of leading American designers and decorators. This book will prove of exceptional value to every one interested in good decoration.

Some idea of the wide scope of this volume may be obtained from the following list of subjects treated, in color, on the 74 full-page plates.

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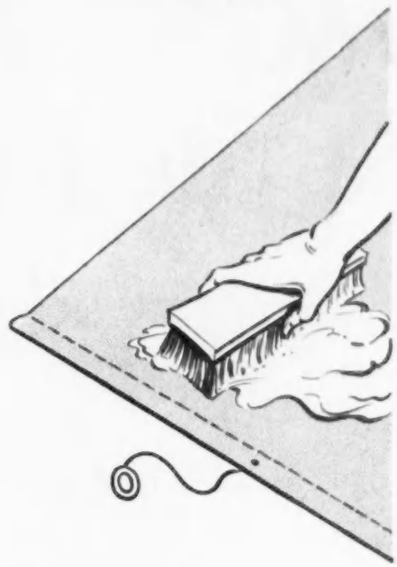

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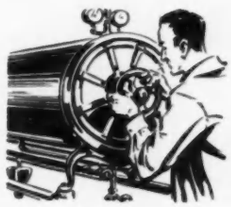

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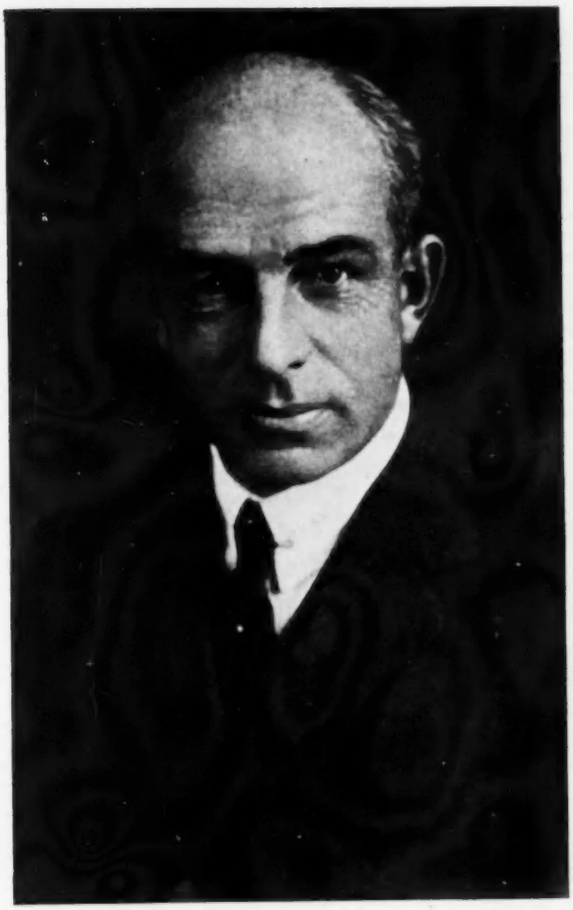
THE EDITORS' FORUM

EDWIN HACKER BROWN
1875—1930



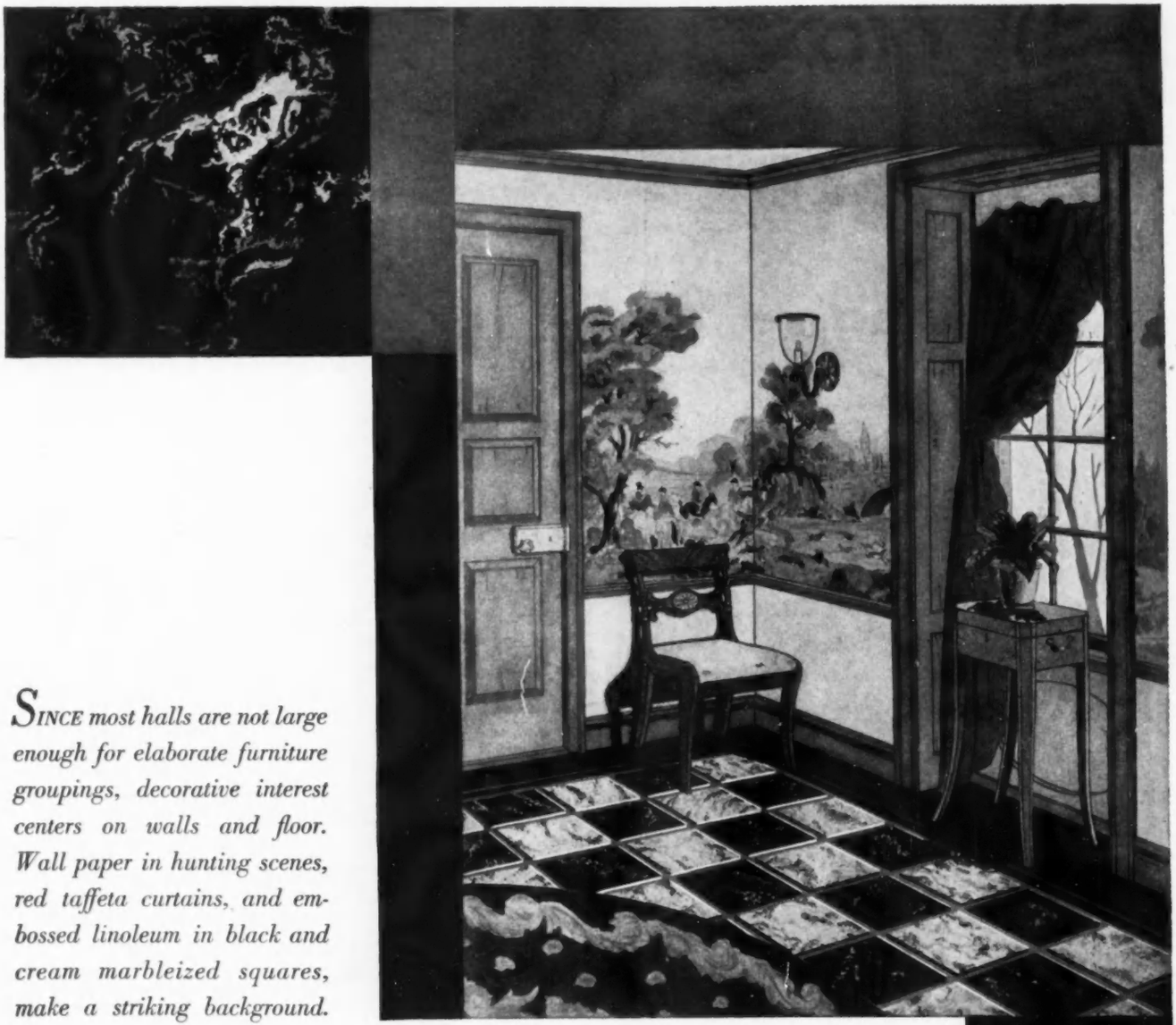
EDWIN HACKER BROWN, nationally known architect, died at his home, Point Lookout, Lake Minnetonka, Minn., April 22. Born in Worcester, Mass., July 29, 1875, he was graduated from Harvard University in 1896 with the degree of Bachelor of Arts, and later from Worcester Polytechnic Institute with a degree of S. B. In 1910 he entered the firm of Hewitt & Brown. For many years he was prominent in his profession, not only in local but also in national affairs. Some of the important examples of his work in Minneapolis are the Hennepin Avenue M. E. Church, the McKnight Building, the Metropolitan Bank Building, Northwestern National Life Insurance Company Building, Dunwoody Industrial Institute, the new Y. W. C. A. and many private residences. In the war he served as field decorator for the bureau and camp service of the American Red Cross at Camp Cody, Deming, N. M., and later in a like capacity at Washington. He was chairman of the Minneapolis Chapter of the American Red Cross. To him more than to anyone else was due the organization of the Architects' Small House Service Bureau, which has become nationally known. He was president of the national organization of the Bureau at the time of his death and vice-president of the Minnesota State Federation of Architectural and Engineering Societies. He was a fellow of the American Institute of Architects, and served as its national secretary. He was still serving on the Hoover Commission of the Department of Commerce on basic building codes at the time of his death. Other organizations with which Mr. Brown was affiliated are the American Society of Mechanical Engineers, American Society Testing Materials, Association of Harvard Engineers, Engineers' Club of Minneapolis and the Phi Gamma Delta fraternity. He was a member of the Minneapolis Club, Woodhill Country Club, Lafayette Club, Harvard Club, Skylight Club, Six O'Clock Club and Professional Men's Club.

CARL E. HOWELL
1879—1930

WORD was received on Tuesday, June 17, of the death at Monrovia, Cal., of Carl E. Howell, member of the well known firm of Cleveland architects, Howell & Thomas. Carl E. Howell, born in Columbus in 1879, the son of Robert and Elizabeth Howell, was educated at Ohio State University and at the Architectural School of the University of Pennsylvania. While at Pennsylvania he won several scholarships, membership in Sigma Xi, the honorary scientific fraternity, and also the John Stewardson Foreign Traveling Scholarship in Architecture. After his return from Europe in 1908 he began the practice of architecture with J. W. Thomas in Columbus. Outstanding examples of the work of Howell & Thomas include the Library and Auditorium Buildings for Ohio University at Athens, O.; East High School of Columbus, O.; high schools in Lakewood and Shaker Heights, O.; churches at Columbus, Canton and Oxford, O.; Y. W. C. A. buildings at Cleveland and Zanesville, and important newspaper buildings in Pittsburgh, Rochester, Brooklyn, New York, Akron, Cleveland, Houston, and Beaumont, Texas. Mr. Howell was a life member of the Museum of Art, a member of the Chamber of Commerce, the University and the Mid-day Clubs of Cleveland, the University of Pennsylvania Club of New York, and the Athletic, Rocky Fork and Columbus Clubs of Columbus, O. He was also a member of the American Institute of Architects and the American Academy in Rome.

MR. CORBETT BECOMES A DOCTOR OF LAWS

IT gives us pleasure to announce that our friend and contributing editor, Harvey Wiley Corbett of New York, internationally known architect, received on May 14 the degree of Doctor of Laws from the University of California in recognition of his services to the fine arts in this country and abroad. This honor to Mr. Corbett came on the date of the 35th reunion of his class, after a trip from New York to California by airplane. Mr. Corbett was born in San Francisco on January 8, 1873. Following his graduation from the University of California in 1895, he attended the Ecole des Beaux Arts, from which he received his degree in 1900.



SINCE most halls are not large enough for elaborate furniture groupings, decorative interest centers on walls and floor. Wall paper in hunting scenes, red taffeta curtains, and embossed linoleum in black and cream marbleized squares, make a striking background.

WE should like to send you an "idea book" on the use of linoleum in modern interior decoration. It contains a wealth of suggestions beautifully visualized, in full color. The illustration reproduced above is one of many covering the more important rooms of the home.

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THE ARCHITECTURAL FORUM

VOL. LIII, No. 2

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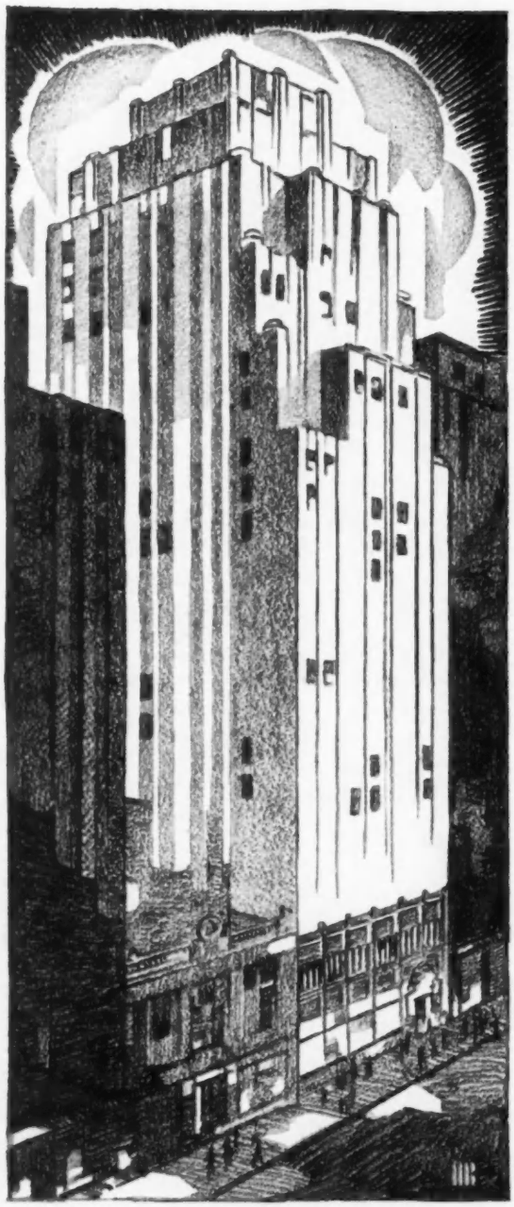

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ARCHITECTURE alone, of all the arts in this country, seems until now to have been without authoritative criticism of current works. The drama is freely criticized in the public press; books are analyzed, praised or condemned by intelligent reviewers; sculpture and painting cause the critics to dip pens in vitriol or violet to influence public opinion, and yet Architecture, the master art, receives only descriptive notice lacking critical quality.

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In inaugurating this new phase of architectural publishing, the Editors recognize that all critics seldom agree. THE ARCHITECTURAL FORUM, in living up to the implications of its name, will also publish opinions and comment other than its own.

THE EDITORS.

Printed in Germany.

DETAIL OF MOSAIC DECORATION IN THE METROPOLITAN LIFE INSURANCE BUILDING, OTTAWA, CANADA, BY BARRY FAULKNER, MURAL PAINTER, D. EVERETT WAID, ARCHITECT.

The Architectural Forum.

UNIV. OF MICH.

THE
ARCHITECTURAL
FORUM

VOLUME LIII NUMBER TWO

AUGUST 1930

MOSAICS IN METROPOLITAN LIFE INSURANCE COMPANY'S BUILDING, OTTAWA

BY

BARRY FAULKNER

THE subject matter used in the mosaic decorations on the ceiling in the lobby of the Metropolitan Life Insurance Company's building is a record of the ideals and accomplishments of the Company. It is, in effect, a large picture book spread on the ceiling, and aspires to be picture writing. The scheme dividing the decoration into small complete groups, running in ordered lines down the ceiling and through the spandrels, was chosen because the hall is comparatively low (17 feet to the top of the vault, on a base of 22 x 40 feet) and because it was desirable that there should be a complete and easily understood group of figures to be looked at from any point in the hall. The figures average 4½ feet in height, and their modest scale helps to make the vault seem farther from the eye. The color scheme is a background of rich gold with the figures in warm and cool neutral colors, with accents of bright green and dull red.

The process of producing the cartoons is easily described. A complete drawing of the design was made at ¾-inch scale. A tracing of this was placed in a plaster model of the ceiling, and a carefully studied color scheme was painted upon the tracing. This was always kept for reference

another on the detached pieces of paper was always maintained by the diagram of the ceiling area on the wall. Care was taken to use a repetition of the same colors and values throughout. Then the cartoons were sent to the mosaic factory. The process followed there was this: the ceiling area was platted off into squares varying from 1-inch to 1½-inches square in area. These were all numbered. The cartoons were then carefully traced. The area and boundaries of every form and color change were distinctly noted. These tracings were transferred in reverse onto thick pieces of paper which were then cut into shapes to correspond with the divisions on the platted out ceiling, and correspondingly numbered. The mosaics that were to make up these varying colors and values were then assembled on large surfaces. For instance, the whites were made up in greatly varying warm and cold gray stones, but so cunningly were they used that the effect is a beautiful, vibrating white. The proportion of colors that produced this was carefully kept in the series of the whites. The same method was used with the other colors. When the tonality had been decided upon and the colors assembled in quantity, then the designs were executed, in reverse, on the tracings upon the pieces of paper. The ends of the glass mosaics were gummed so that they stuck securely to the pieces of paper. When they were finished, the observer saw the back of the mosaic, the part which would later be forced into the soft cement of the ceiling. The face of the mosaic,—the surface that would later appear as the surface of the ceiling,—was firmly fixed to the paper. That is the reason for reversing the design. An expert mosaic maker can then go over the mosaic in this state and make such corrections and reinforcements as seem good to him; but a beginner sees a strange interpretation of his design, for it is reversed and between

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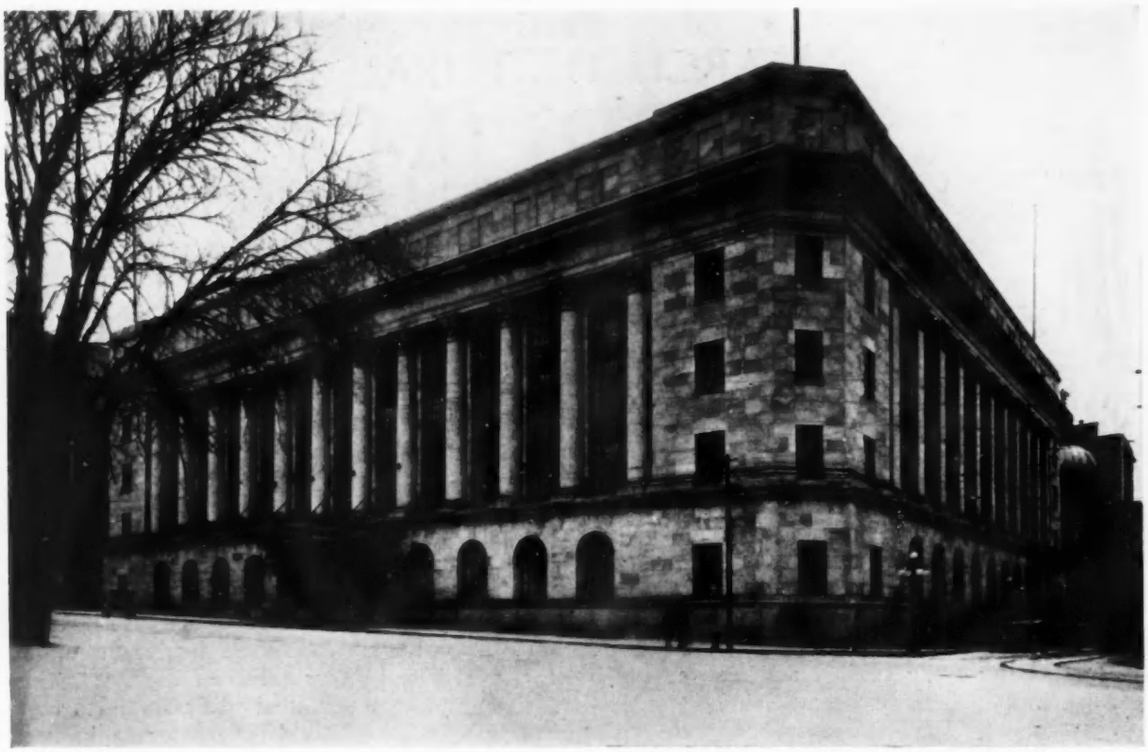
The process of producing the cartoons is easily described. A complete drawing of the design was made at ¾-inch scale. A tracing of this was placed in a plaster model of the ceiling, and a carefully studied color scheme was painted upon the tracing. This was always kept for reference. The original black and white drawing was then solar-printed up to the actual size. This drawing had been studied with considerable care, so that the final cartoons could be made by drawing over and correcting these solar-printed drawings. The important technical feature of the enlargement was to make the cartoons so accurately that when put together they would fit perfectly. One quarter of the area of the ceiling had been platted off upon the studio wall. Then the corrected solar-printed drawings were traced and painted upon large sections of detail paper in columns corresponding to those of the colored model. The relation of the different groups of figures to one another on the detached pieces of paper was always maintained by the diagram of the ceiling area on the wall. Care was taken to use a repetition of the same colors and values throughout. Then the cartoons were sent to the mosaic factory. The process followed there was this: the ceiling area was platted off into squares varying from 1-inch to 1½-inches square in area. These were all numbered. The cartoons were then carefully traced. The area and boundaries of every form and color change were distinctly noted. These tracings were transferred in reverse onto thick pieces of paper which were then cut into shapes to correspond with the divisions on the platted out ceiling, and correspondingly numbered. The mosaics that were to make up these varying colors and values were then assembled on large surfaces. For instance, the whites were made up in greatly varying warm and cold gray stones, but so cunningly were they used that the effect is a beautiful, vibrating white. The proportion of colors that produced this was carefully kept in the series of the whites. The same method was used with the other colors. When the tonality had been decided upon and the colors assembled in quantity, then the designs were executed, in reverse, on the tracings upon the pieces of paper. The ends of the glass mosaics were gummed so that they stuck securely to the pieces of paper. When they were finished, the observer saw the back of the mosaic, the part which would later be forced into the soft cement of the ceiling. The face of the mosaic,—the surface that would later appear as the surface of the ceiling,—was firmly glued to the paper. That is the reason for reversing the design. An expert mosaic maker can now go over the mosaic in this state and make such corrections and reinforcements as seem good to him; but a beginner sees a strange interpretation of his design, for it is reversed and between



Paul J. Weber
Metropolitan Life Insurance Company Building, Ottawa. D. Everett Waid, Architect

Detail Depicting the Rescue of Sufferers From a Flood. Mosaics by Barry Faulkner

each two tesseræ is a dark space later to be filled by gray plaster; also the gold resembles a sickly green, for the gold tesseræ are gilded on one surface only, and at this time one is looking at its back. It is a bit confusing if this is one's first mosaic.

The mosaic is now ready to be put into place. The ceiling of the hall is to be covered by approximately ¾-inch of cement, a little less than the length of a tessera. The surface of the ceiling is divided off into numbered squares, to which the numbered pieces of paper correspond. A part of this surface is covered with a coating of lime. If sections from, say one to ten, have been covered, then the papers one to ten are taken and each one forced into the cement in its proper place. After the cement has set a little, the paper is washed off from the mosaic, and there is the design right side up. It is then that one sees the design with the gray lines of cement instead of dark shadows showing between the tesseræ. As they dry they become very white, and the mosaic looks as though it were covered by a chalky white mist. The worker then stains these interstices with dry color and water, and by means of this process he has comparative control of the final appearance of the mosaic. If portions of the mosaic fail to be dark or rich enough, he applies darker coloring matter to the cement. On the other hand, if the mosaic looks right without tinting, he obviously leaves it alone.

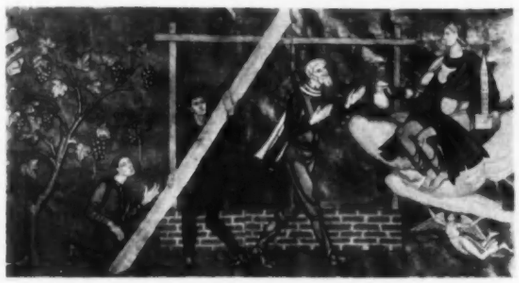
The making of these cartoons took about eight

Paul J. Weber
Metropolitan Life Insurance Company Building, Ottawa. D. Everett Waid, Architect

months. The execution of the mosaic and its installation required six months. The venture made by the Metropolitan Life Insurance Company in decorating this lobby with mosaics is interesting, for this experiment meant the solution of the problem of what is the richest and most beautiful material for the decoration of a hall lined with marble or built of stone. It is also the most practical for a business structure, and preëminently so in a city with a smoke- and dust-laden atmosphere, such as New York. The mosaics do not change or deteriorate, and to clean them one merely turns on the hose!

The ceiling depicts the unusual and highly successful achievements of the Metropolitan Life Insurance Company in its welfare work. In the spandrels are shown phases of the welfare work among the employes,—the athletic associations, the musical societies, work on old age pensions, and the solidarity of the employes and their entire dependence upon the Company, which are important factors in its success. The central lines of figures show the Company in relation to its policy holders, and symbolize its great campaign against disease by spreading information for its prevention. The furnishing of visiting nurses to policy holders has been a great success, and at times of epidemic it has been a great boon to the community at large. The Metropolitan Life Insurance Company has a splendid record for rendering assistance at times of floods or conflagrations. These also are suggested in the mosaics.

Detail Depicting the Feeding and Clothing of the Needy. Mosaics by Barry Faulkner



Lending Money
For Rebuilding

Rescuing Flood
Sufferers

Medical Instruction
Against Disease

Feeding and Clothing
the Needy

Nurse Tending
Obstetrical Case

Nurse Tending
Accident Case

The Musical Society

The Athletic Society

Metropolitan Life Insurance
Company Building, Ottawa.
D. Everett Waid, Architect.
Mosaics by Barry Faulkner

WEST SIDE Y. M. C. A., NEW YORK

DWIGHT JAMES BAUM, ARCHITECT

THE style decided upon for the design of this building was that of the fifteenth century as found in the Italian provinces of Lombardy and Tuscany. After the early heaviness of the Romanesque, a Gothic feeling crept in which permitted greater delicacy of detail and the development of color in terra cotta. Its refinement of character and handling makes this one of the most adaptable types of architecture. After the style was decided upon, the architect began studying materials to get the effect desired, and found in South Carolina a brick of pastel shades, having a texture quite different from anything that hitherto had been used in New York. Furthermore, it carried out in its character the effect of some of the old brickwork of northern Italy. He combined this brick with polychrome terra cotta, characteristic of this period.

The two main entrances on 63rd Street embody details from old palace and cathedral doorways. The handling of the stone of the first two stories, combined with the harmonious colors of the terra cotta decorations surmounted by the walls of warm brown brickwork of rough texture, produces a very pleasing effect. On the 63rd Street facade a new idea was carried out by bringing the elevators forward to the setback line. This gives a tower-like appearance to the front of the building, producing an effect of much greater height than would otherwise be possible with the 16 or more stories of the structure. In plan the setbacks required by the zoning law were taken advantage of to provide interesting bedrooms with double exposures on several different floors. The top of the tower itself is used for the storage of elevator machinery, electric motors, ventilator blowers, etc., as well as for space for the large storage water tanks which supply the building with a reserve for fire purposes. In the design of the 64th Street facade the walls of the gymnasium and hand ball courts were made a decorative feature. The large gymnasium is lighted by three enormous windows, which were designed to give this facade the appearance of an old Italian palace. The long corbeled balcony of brick below the gymnasium windows is a distinctive feature of this elevation. The main door on this street, which serves as entrance and exit for the theater, is a carefully studied bit of Romanesque detail.

This structure, one of the most complete institutional buildings of its kind ever erected, has so many features of plan and design that it is possible to mention only part of them here and in Part Two.

LONG since out of date and over-crowded, the old Y.M.C.A. building on West 57th Street, New York, was sold two years ago to Otto H. Kahn, supposedly to be replaced by a new Metropolitan Opera House. But the new Opera House is still a dream, while the new West Side Y.M.C.A. building is a reality.

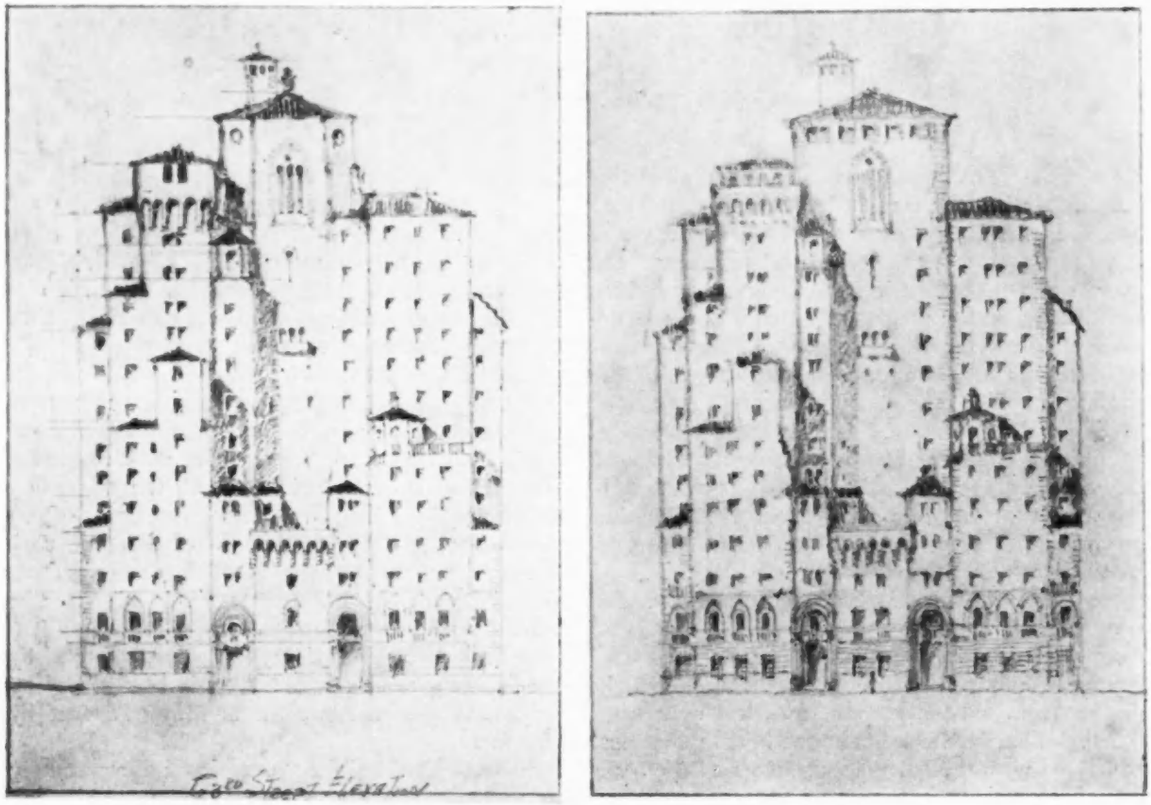
SITE AND AREA. To provide adequate space for many and constantly growing activities and requirements, a plot of ground was purchased just off Central Park West, under which runs the new Eighth Avenue subway, with the Broadway subway a half block to the west. The site extends through the block from 63rd Street to 64th Street, 200 feet on each. Of this area the present building occupies 125 feet on each street. The remaining 75 feet are still occupied by old fashioned high stoop houses, which when required by the future growth of the "Y," will be replaced by an addition to the present building, 75 feet by 200 feet.

COST. The building contains approximately 3,036,000 cubic feet and cost per foot 68 cents. The total cost of the building was $2,009,000, which with the furnishings, equipment and land made a total of $3,500,000.

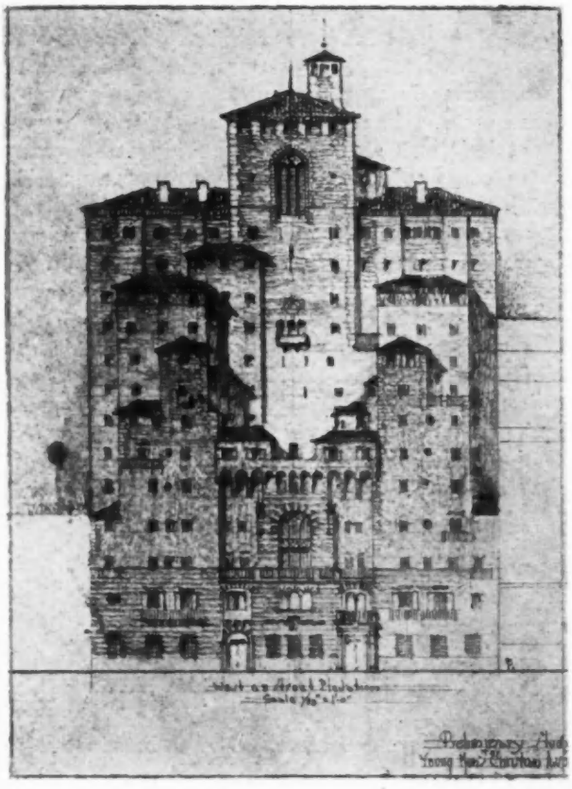
REQUIREMENTS. The architectural department of the National Headquarters of the Y.M.C.A. spent years in working out the requirements of this new and largest unit in the chain of benevolent buildings erected during the past 40 years from coast to coast for the youth of the land. With the details of the problem well in hand the department wisely sought the aid of an architect to put its ideas into concrete form with a suitable and architectural expression. To Dwight James Baum, who was chosen as architect, fell the task of planning a building which would conveniently and attractively house the many activities and requirements of a modern "Y." This was no small undertaking. Under one roof these six practically distinct organizations had to be so taken care of that each was a complete unit in itself:

1. MEN'S DEPARTMENT.
2. BOYS' DEPARTMENT.
3. SCHOOL FOR 300 BOYS.
4. DORMITORY OF 600 ROOMS.
5. MANAGEMENT.
6. MECHANICAL EQUIPMENT.

Each of these departments had to be separately accessible and separately used.

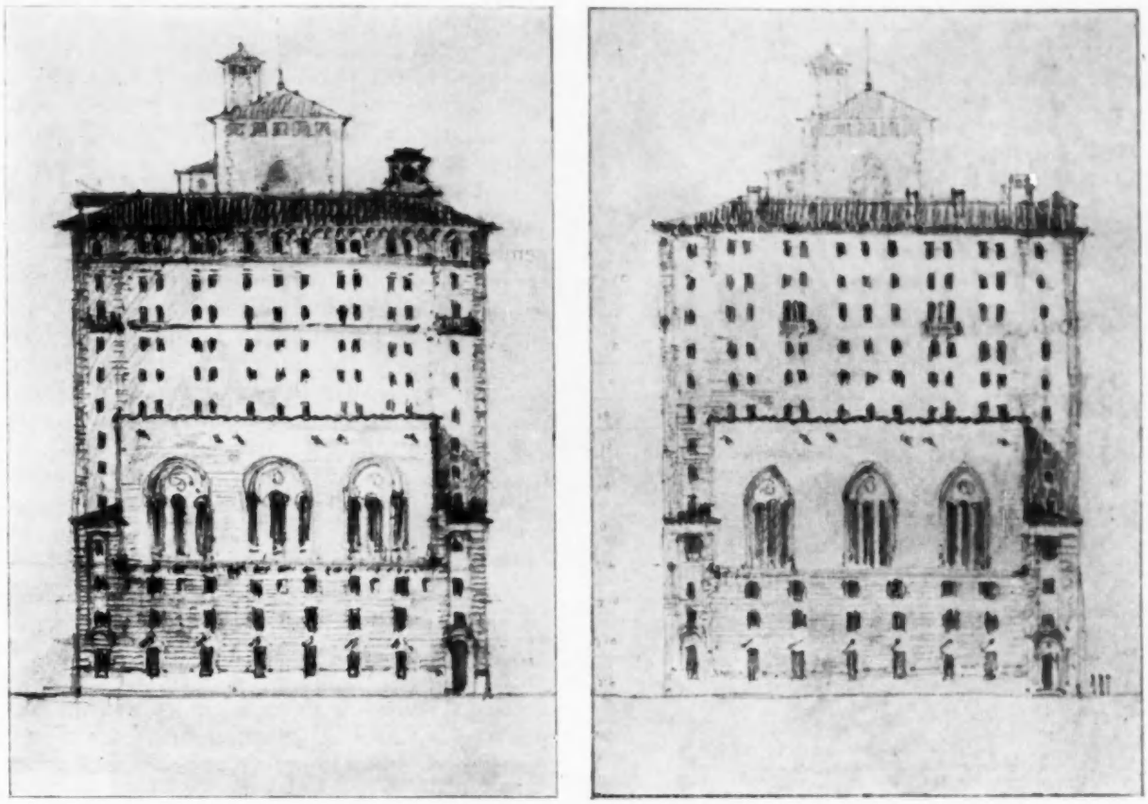


Studies of the 63rd Street Elevation, West Side Y. M. C. A., New York. Dwight James Baum, Architect



The rooms required in each department are listed here:

1. THE MEN'S DEPARTMENT.
   - A. Entrance lobby, reception, coat and toilet rooms.
   - B. Social, reading, club and banquet rooms.
   - C. Cafeteria and spa.
   - D. Gymnasium and locker room.
   - E. Showers and toilets.
   - F. Swimming pool.
   - G. Boxing, wrestling and fencing rooms.
   - H. Handball courts.
   - I. Auditorium with deep stage.
   - J. Barber shop.
   - K. Massage, hot and violet ray rooms.
2. THE BOYS' DEPARTMENT.
   - A. Entrance lobby and coat and toilet rooms.
   - B. Social, club, scout and reading rooms.
   - C. Lunch counter.
   - D. Gymnasium and locker room.
   - E. Showers and toilets.
   - F. Swimming pool.
3. SCHOOL FOR 300 BOYS.
   - A. Entrance hall, locker and toilet rooms.
   - B. Study hall and library.
   - C. Eight classrooms.

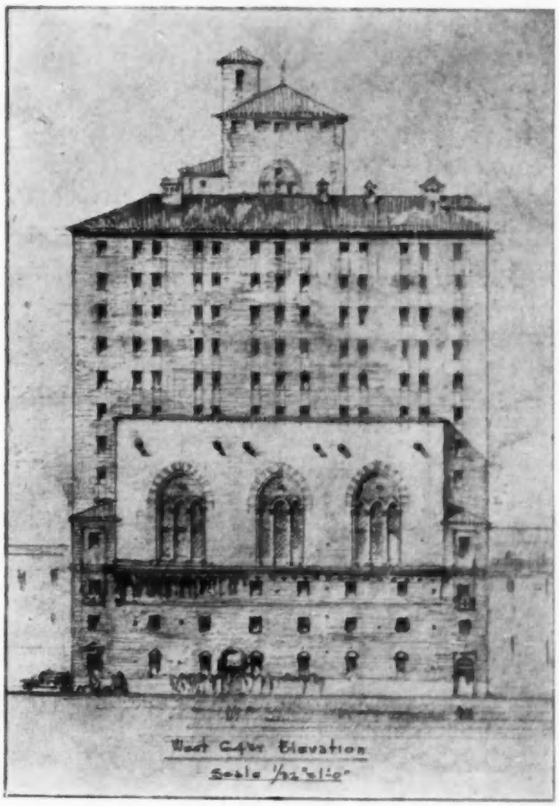


Studies of the 64th Street Elevation, West Side Y. M. C. A., New York. Dwight James Baum, Architect

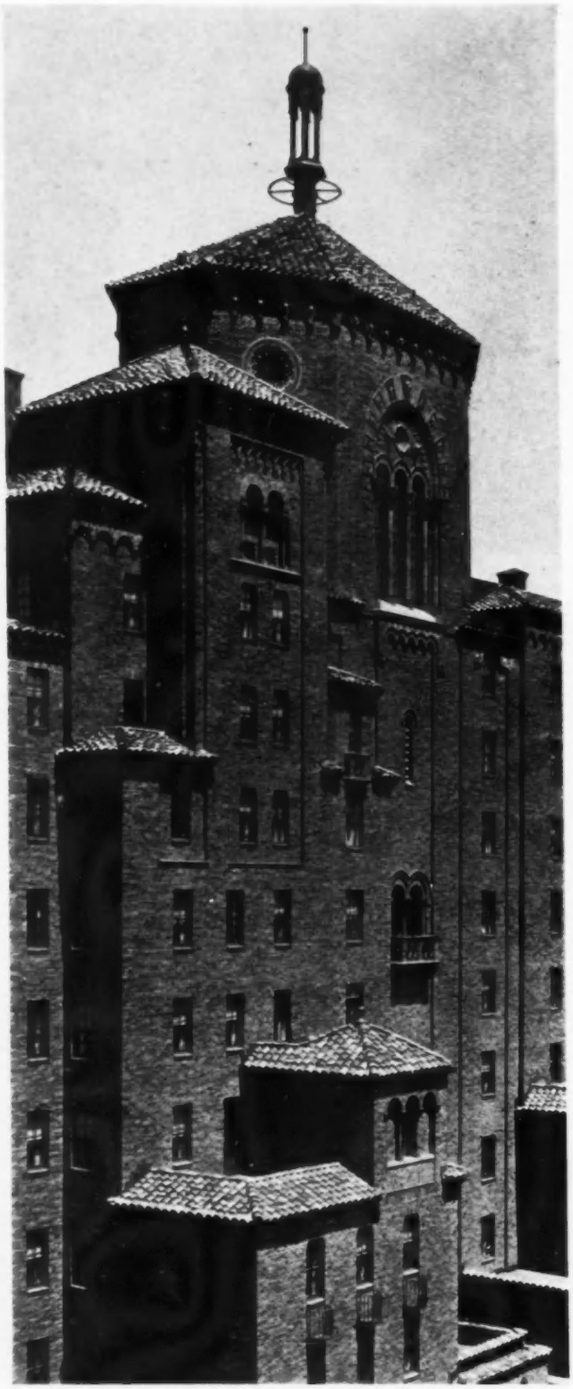
D. Trophy room.
E. Head master's room.
F. Physics and chemistry laboratories.
G. Book and storage rooms.
H. Special exercise room.

4. DORMITORY.
   A. 600 bedrooms located in the south half of the fifth, sixth and seventh floors, and the entire eighth to thirteenth floors.
   B. Wash, toilet, shower and store rooms on each of the dormitory floors.
   C. No rooms have baths attached
   D. All of the rooms are for single occupancy.

5. MANAGEMENT.
   A. Manager's office and reception room.
   B. Cashier's office.
   C. Mail room.
   D. Eight small offices for clerks and accountants.
   E. Kitchen.
   F. Kitchen service and storage rooms.
   G. Receiving room.
   H. Superintendent's room.
   I. Linen room.
   J. Work shop.
   K. Male help locker and toilet rooms.
   L. Female help locker and toilet rooms.



6. MECHANICAL EQUIPMENT.
   A. Boiler room.
   B. Fuel storage.
   C. Dynamo room.
   D. Fan room.
   E. Engineer's office.
   F. Toilet room.
   G. Ash hoist and motor room.



Tower on 63rd Street

COMPLEXITY OF THE PROBLEM. When one recognizes the fact that this building presented the problems of a rather extensive educational institution, a religious institution, a boys' club, a hotel, and an athletic club, one appreciates something of the complexity of the problem.

LIMITED LOT AREA. Furthermore, the fact that the building is planned for the use of 10,000 members required duplication of some of the larger units in the building, such as gymnasiums and swimming pools. These requirements, together with the limited lot area and certain special requirements, presented the most complicated planning problem yet encountered in any association building. The land area available was very limited for the facilities required, being an inside lot only 125 feet in width by 200 feet in depth. This made it necessary to place on different floor levels certain facilities, such as locker rooms, showers, and pools, which it would have been preferable to have had on the same floor levels.

SUPPORT OF DORMITORIES. The limited land area and the height limitations imposed by the zoning law also made it necessary to carry an eight-story wing of dormitories over a 63-foot span above the main gymnasium. This would seem at first glance to be uneconomical, but, when it is recognized that the additional land required for a plan which would accommodate the facilities without carrying this load over the gymnasium would have cost $250,000, it is at once apparent that the greater economy was gained by the method pursued. Additional cubage for the housing of heavy structural members over the gymnasium was made unnecessary by a rather ingenious arrangement which placed six handball courts and their required corridor space between trusses forming the structure which carried the eight stories of sleeping rooms above.

LOCATION OF POOLS. One of the most difficult requirements was that of providing two swimming pools so related that either or both of them might be accessible from the men's department or from the boys' department, without any crossing of paths or intermingling of these two groups. It will be noted from study of the second floor plan that the two swimming pools are so related that boys approaching from one side and men approaching from the other side make it possible for the pools to be used interchangeably.

INTERCHANGEABLE SHOWERS. It will further be noted that the several batteries of showers between the two pools are so arranged that by the locking and unlocking of control doors the majority of showers may be made available to boys on occasion of their peak load or may be made available to men when a similar condition obtains in the men's department.

Main Office Lobby, West Side Y.M.C.A., New York

THE PURPOSE OF THE NEW TYPE OF "Y"

BY

R. L. RAYBURN

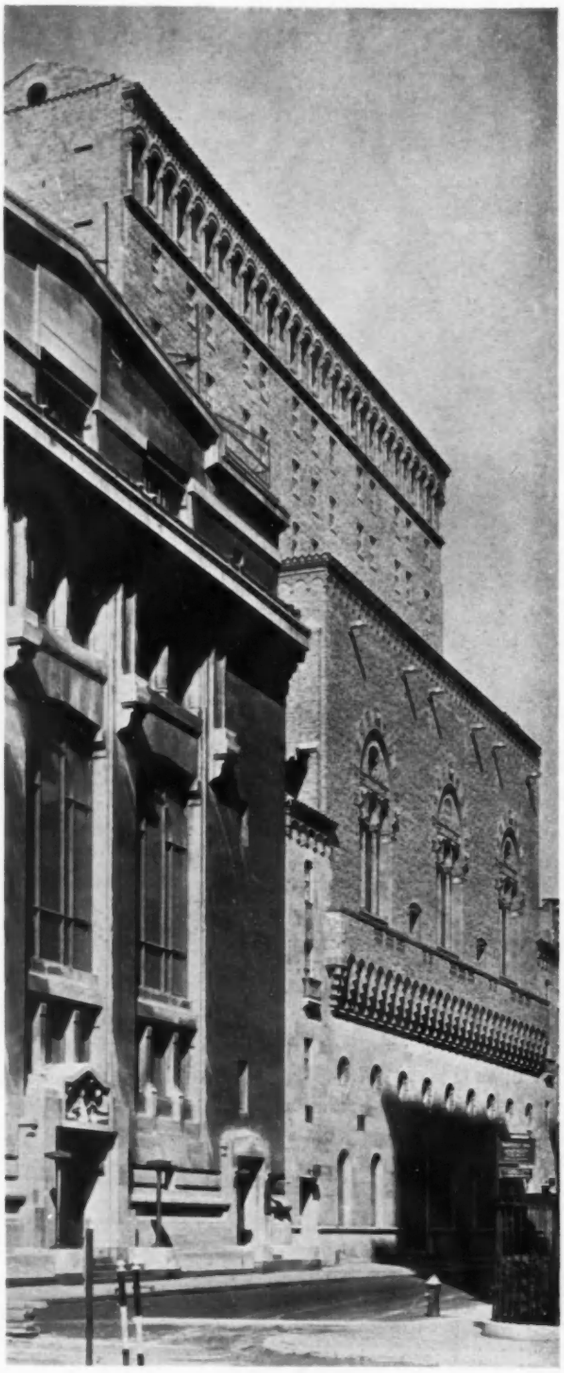
OF THE ARCHITECTURAL BUREAU, NATIONAL COUNCIL OF THE Y. M. C. A.

IN the past those in charge of philanthropic and service institutions have realized that their buildings would be subjected to heavy use and have taken it for granted that they would also be subjected to all kinds of abuse. The most superficial study of the buildings of the Young Men's Christian Associations of the country would convince any competent critic that this point of view, and a lack of artistic appreciation on the part of building committees, were evident in the character of most of the "Y" buildings constructed until the last decade. The best that could be said of them was that they were generally rather drab, uninteresting structures, and many of them were architectural abortions.

Although the architectural profession, generally, recognized this condition before the Association did, it is interesting to note that the almost complete change in point of view and practice which has taken place in the last decade has come largely from within the Association itself. This is perhaps natural because of the peculiar program and genius of the organization. The organization's one purpose is that of guidance of boys and young men in character development. It seeks to develop full-rounded manhood by giving attention to the spiritual, mental, physical and social welfare of its members. It has also ever been adaptable to change, its chief genius being in its ability to find new ways of attaining its fundamental purpose. It seems inevitable, therefore, that sooner or later its emphasis on the true cultural values of life should lead to an examination of the influence of its buildings and equipment.

The leaders of the movement now believe that there are two ways in which the Association may profoundly influence character development,—first, by the program of activities it provides for young men and boys; second, and fully as important, by the atmosphere or environment with which it surrounds these members as they participate in the program. Just as with music any of the human impulses and emotions may be created or stimulated, so by use of line, form and color the Association conceives that it may establish an atmosphere which will tend to stimulate the noblest impulses and emotions and be an impetus to right living, clean thinking and the highest aspirations of life.

In the new West Side Building in New York, the architect, Dwight James Baum, has ably ex-

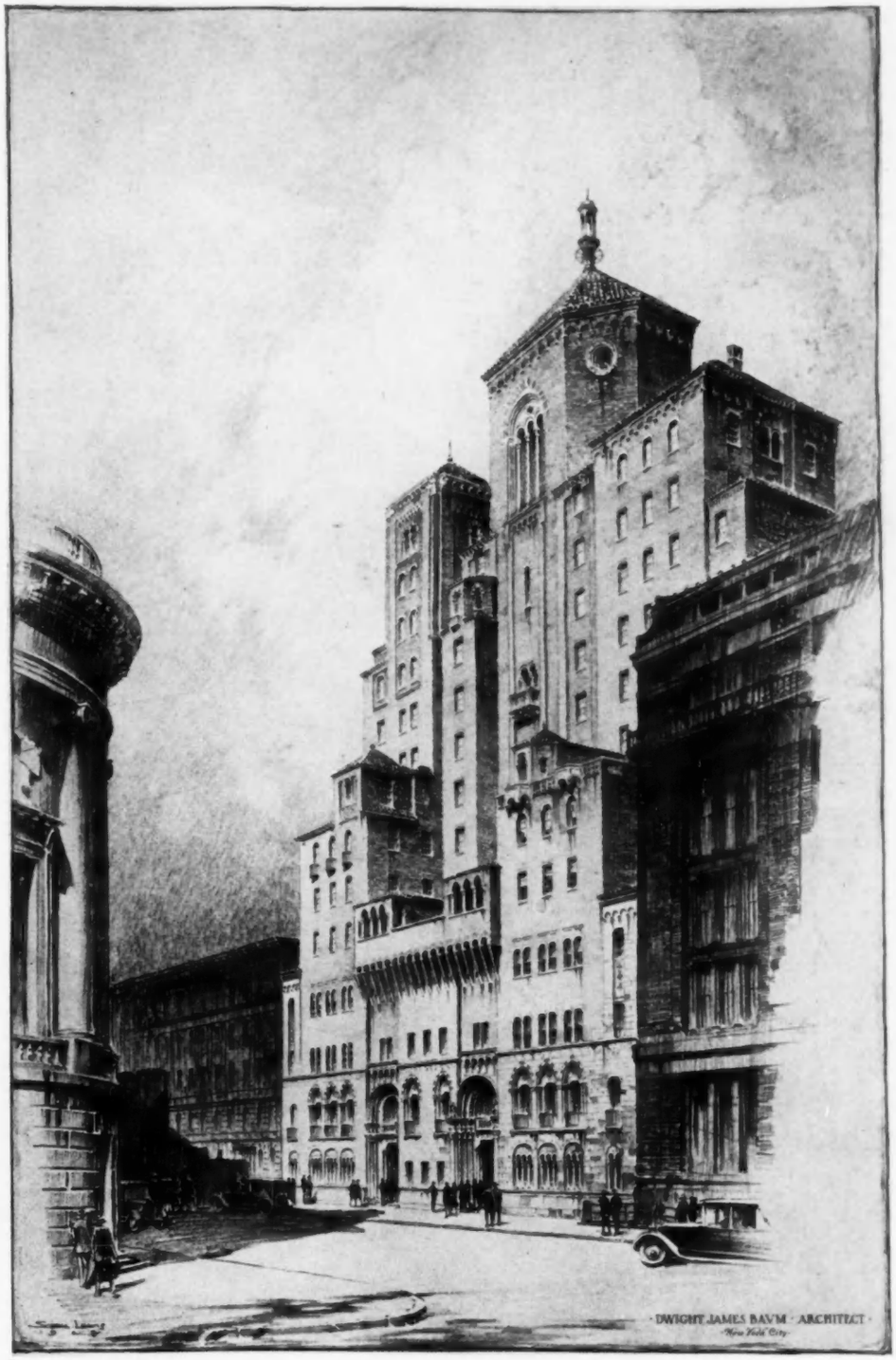


The 64th Street Facade
West Side Y.M.C.A., New York

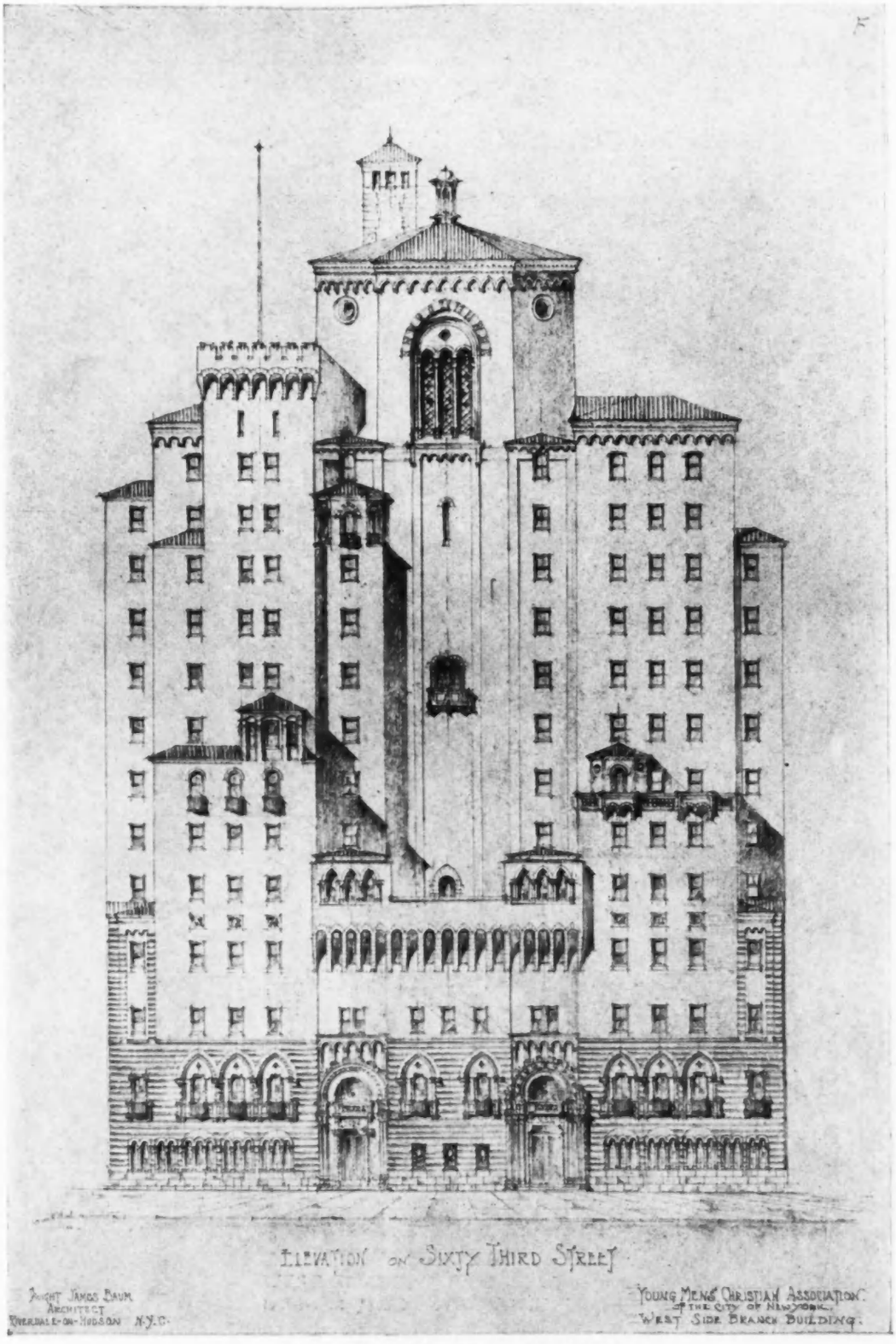
pressed this new philosophy. In this building, as in many others built during recent years, results are immediately apparent in the changed conduct of the members. In the old type building the signs such as "No Profanity," "Please Take Off Your Hat," "Have you Written to Mother?" "Don't Spit on the Floor," which hung about the building, were an index to its lack of cultural influence. In the belief that the only type of conduct which will have lasting results in character formation is that which is voluntary, the Association is turning from prohibitory mandate to the silent, subtle preachment of atmosphere, surroundings and example. Someone has said that young men and boys are like mirrors, quickly reflecting in their conduct the atmosphere of their surroundings. The Association is finding that young men and boys will live up to almost any atmosphere it establishes for them, and that they tend, also, to live down to a poorly designed and unattractive equipment. The completion of a number of the newer type of buildings, carefully furnished and decorated, provides ample demonstration of these contrasts in conduct.

In one of the larger cities of the East, the Association had occupied a building with the older type of equipment for about 35 years. In this old building one usually found most of the men in the social rooms sitting with their hats on, feet on the window sills or furniture, expectorating on the floor, and conducting themselves in a manner which ignores the refinements and proprieties of life. The lack of respect for property was also evidenced by the way in which the building was carved up by jack knives and otherwise abused. Recently, the organization moved into a new, well designed and carefully furnished and decorated building, taking about 2,000 members from the old into the new. The week the building opened, the president of the Association happened to be standing inside the entrance engaged in conversation with a member of the Architectural Bureau's staff. As they conversed, the president called attention to the fact that although every chair in the social room was filled, there was not a man sitting with his hat on and, as they stood and watched for a quarter of an hour, practically every young man who came in, after glancing around, subconsciously reached for his hat. The president remarked: "Already the furnishings and decorations of this building are having their effect on the manners and conduct of the young men and boys who use it." Psychologists of today are putting more and more emphasis on the importance of "learning by doing." If the Association can surround its members with an atmosphere which produces gentlemanly conduct by natural reaction, it has taken a great step forward. Nor is it a matter of conduct alone. The Association is seeking by the character of its buildings, furnishings and decorations, to create early in the lives of its members a love of the beautiful in physical things and the appreciation of the beautiful in personal conduct and human relationships.

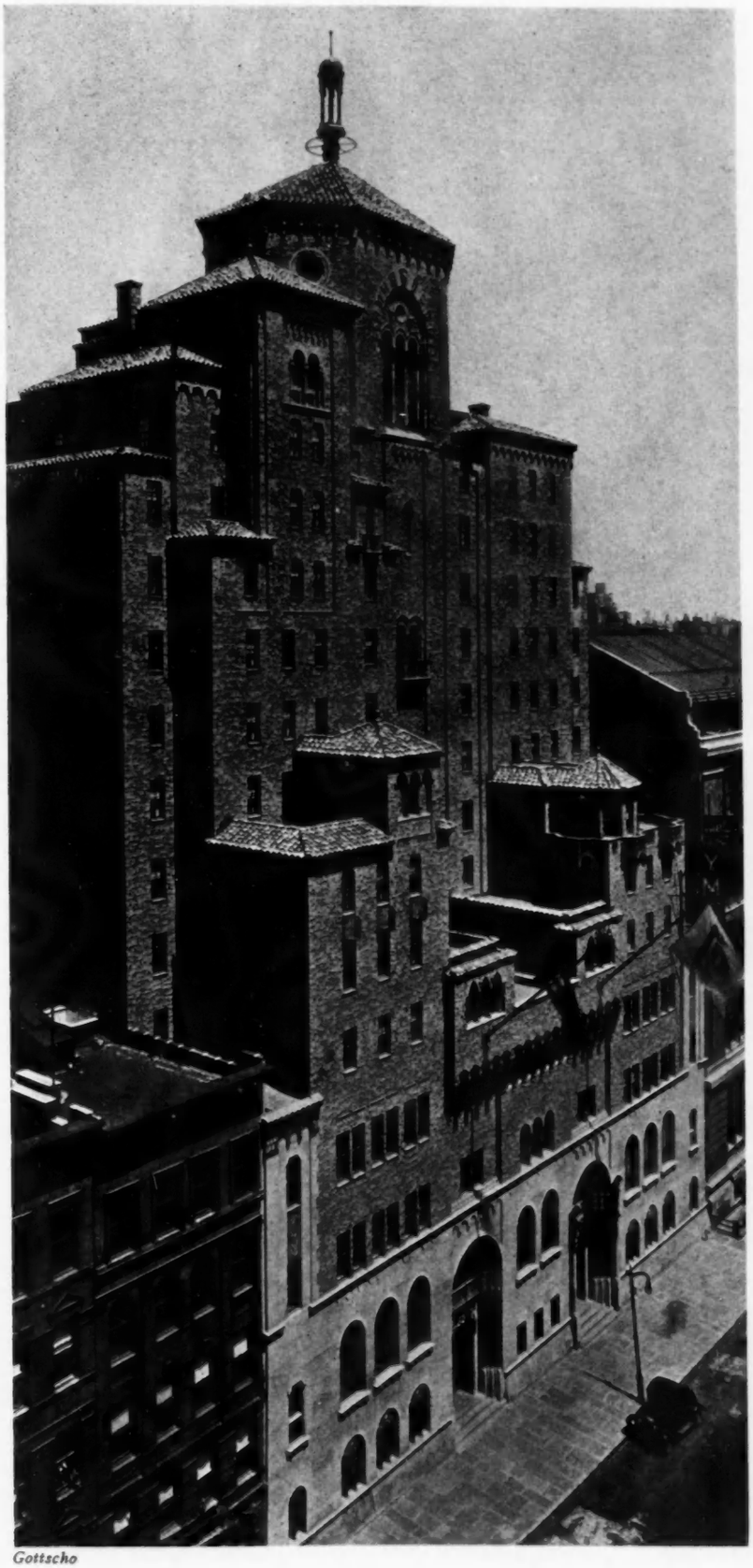
WEST SIDE Y. M. C. A. BUILDING
NEW YORK
DWIGHT JAMES BAUM, ARCHITECT



Dreyer



FINAL STUDY, 63rd STREET ELEVATION
WEST SIDE Y. M. C. A., NEW YORK
DWIGHT JAMES BAUM, ARCHITECT



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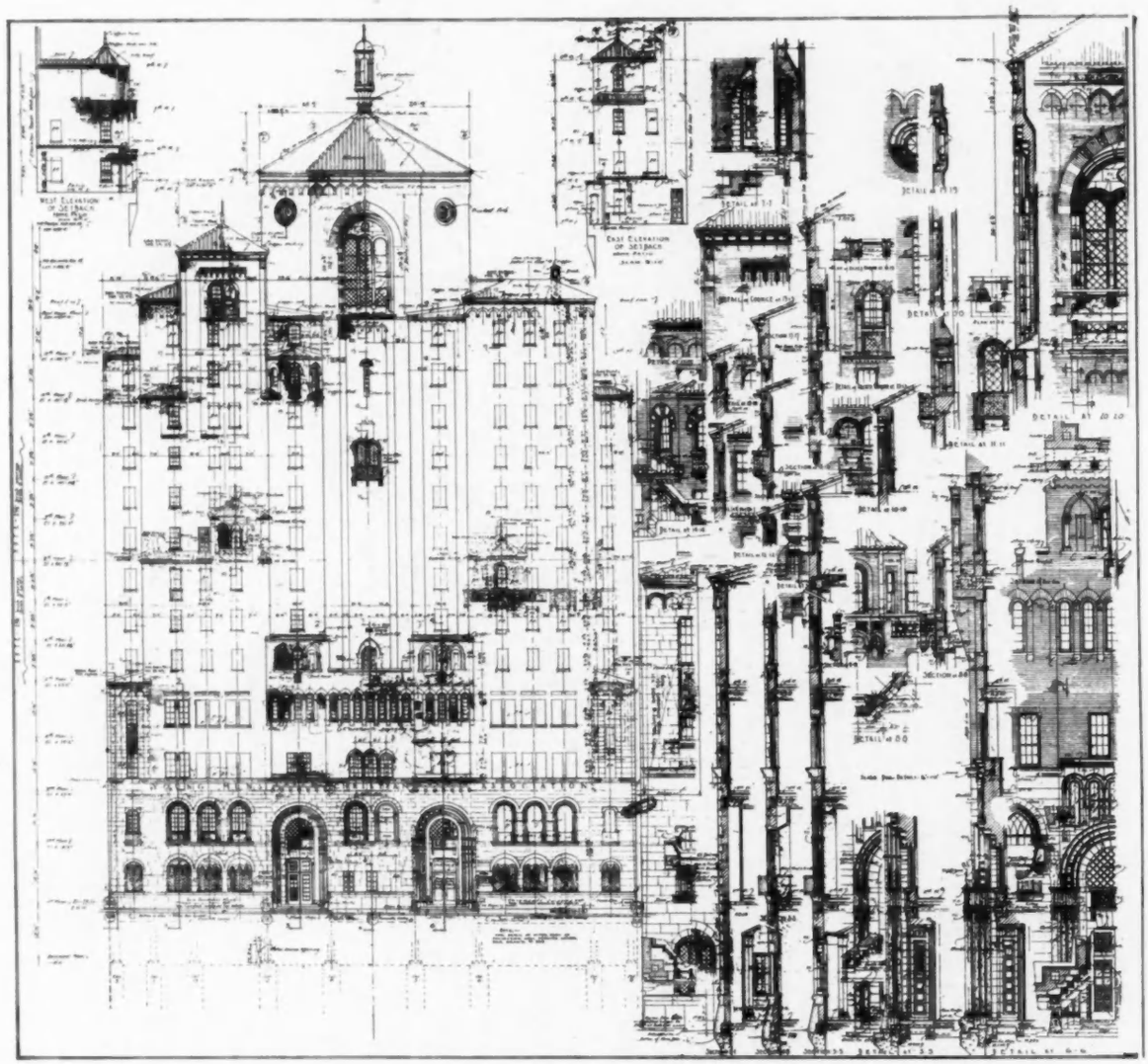
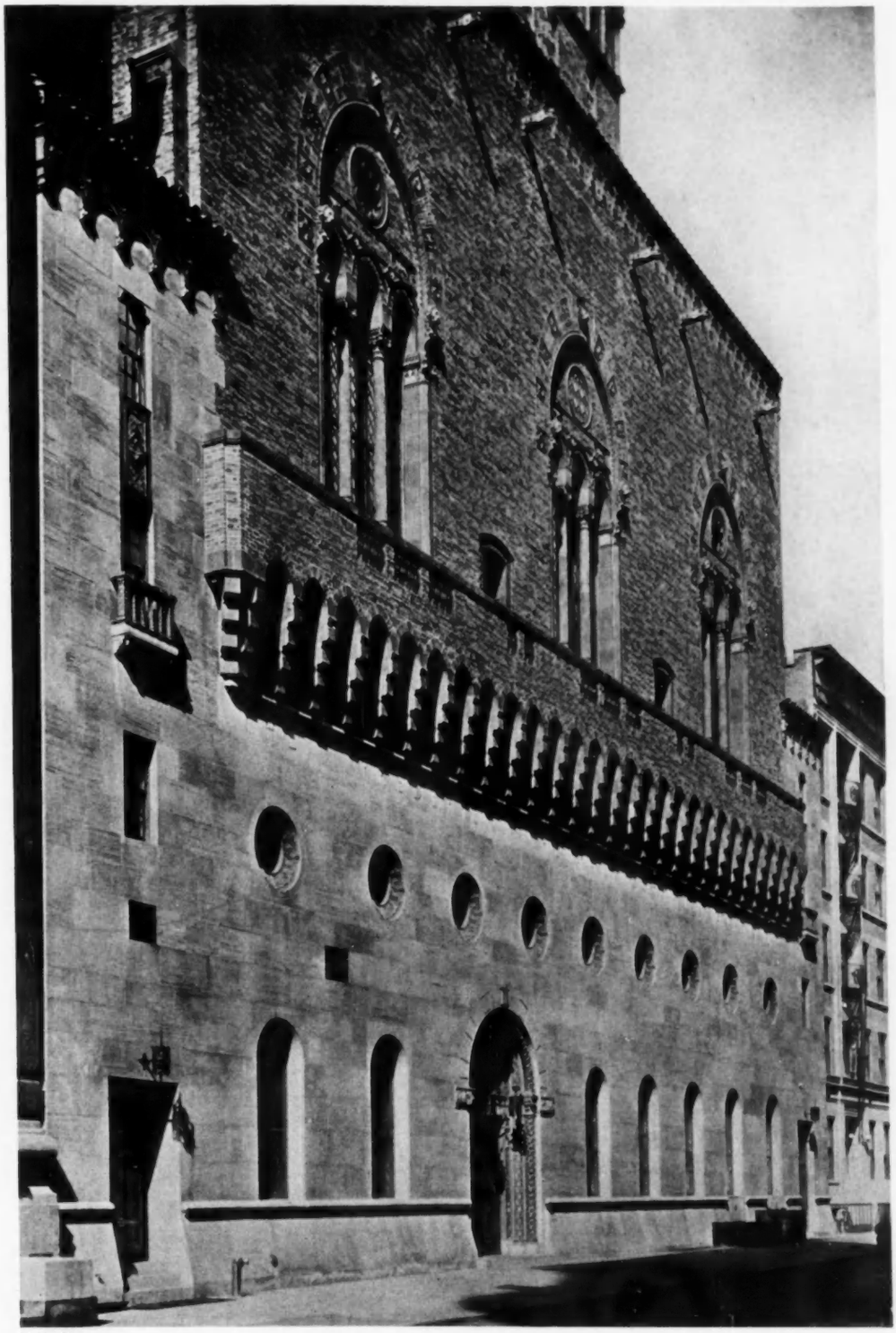
63RD STREET FACADE WEST SIDE Y. M. C. A., NEW YORK. DWIGHT JAMES BAUM, ARCHT.



ELEVATION AND SECTIONS OF
THE 63rd STREET FACADE

WEST SIDE Y. M. C. A., NEW YORK
DWIGHT JAMES BAUM, ARCHITECT



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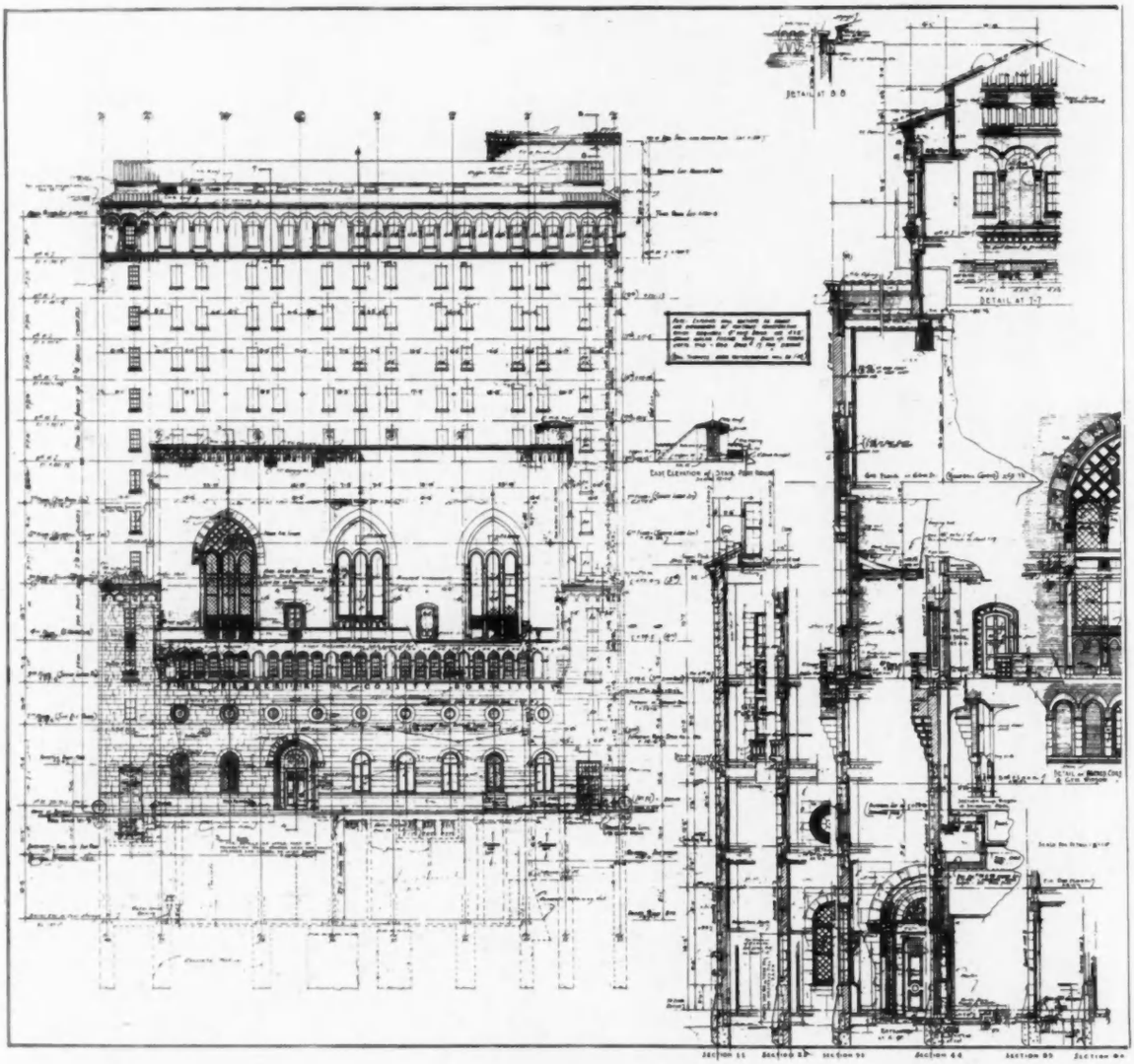
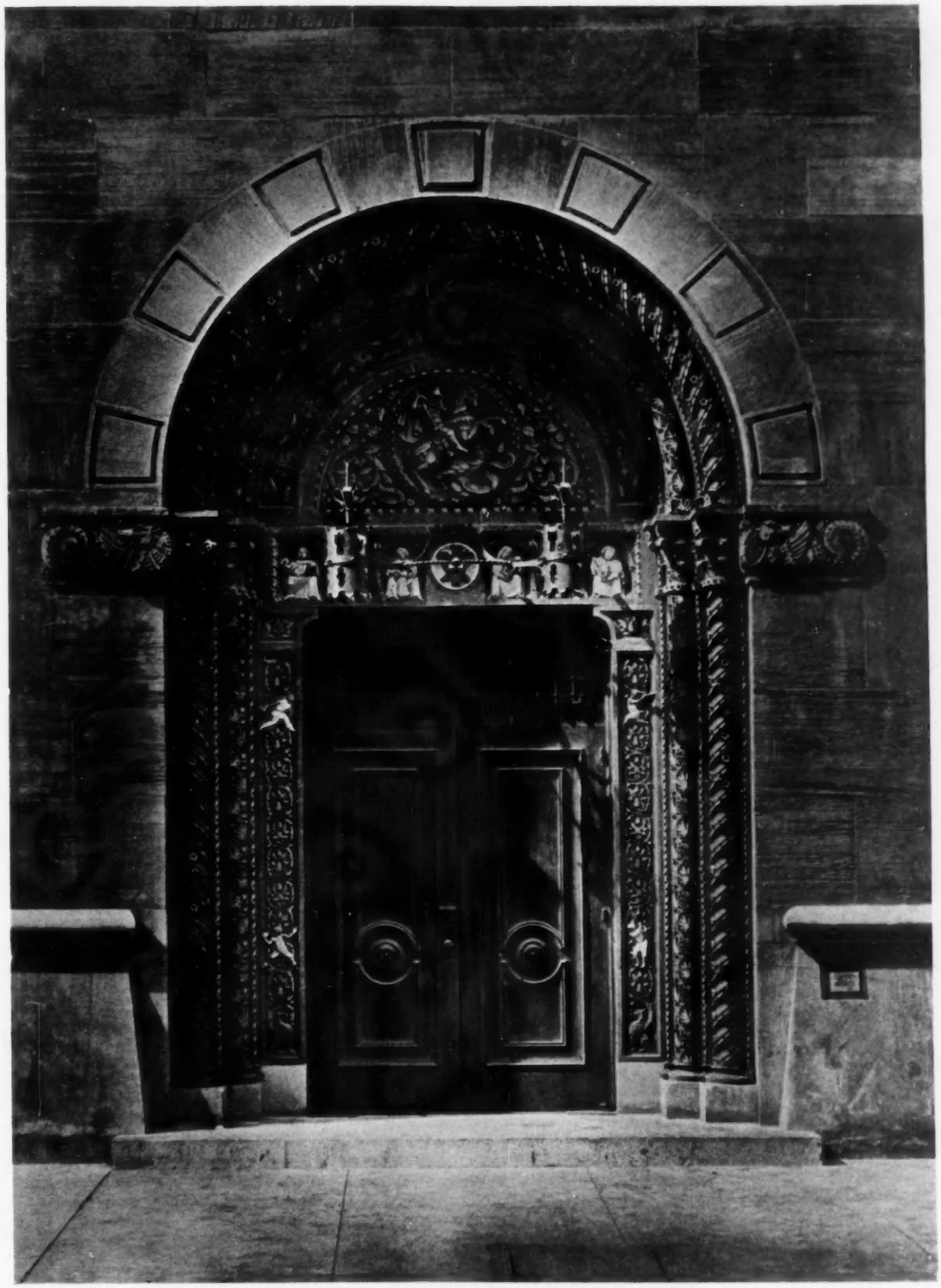
LOWER PART, 64th STREET FACADE

WEST SIDE Y. M. C. A., NEW YORK
DWIGHT JAMES BAUM, ARCHITECT



ELEVATION AND SECTIONS OF
THE 64th STREET FACADE

WEST SIDE Y. M. C. A., NEW YORK
DWIGHT JAMES BAUM, ARCHITECT



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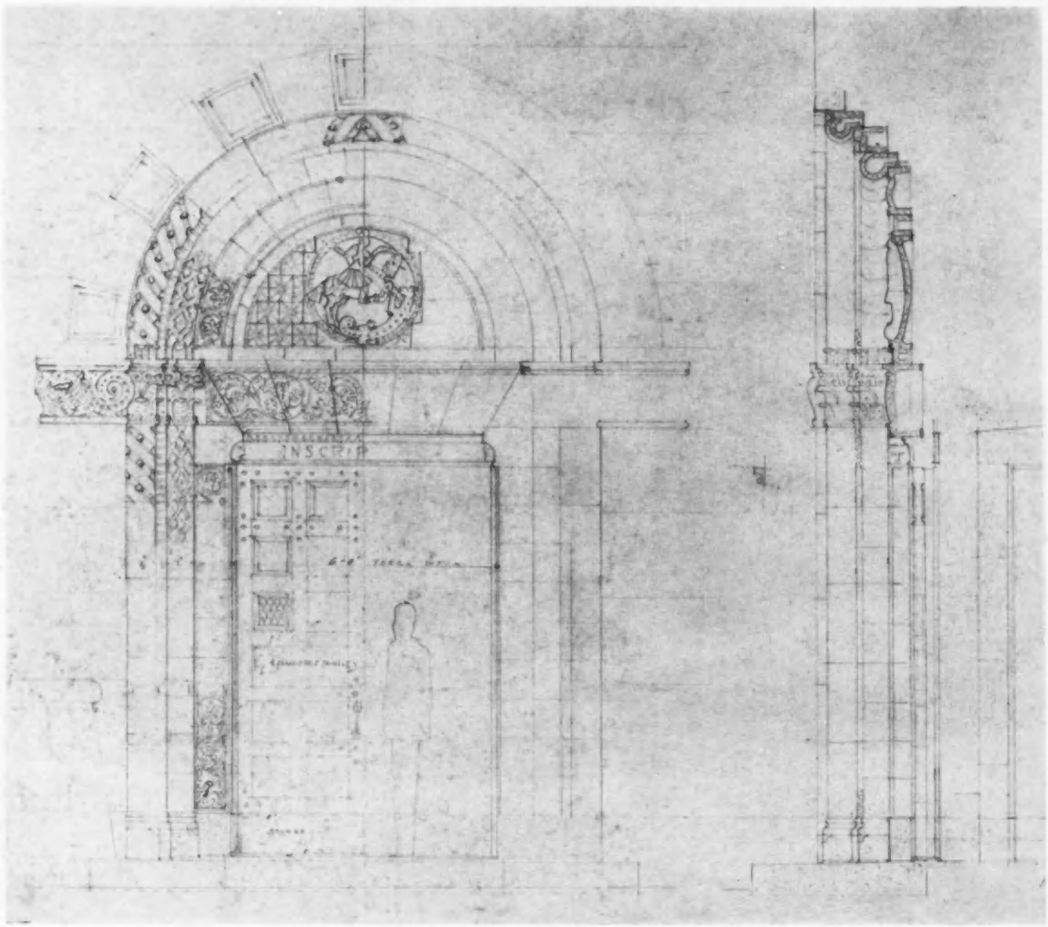
MAIN ENTRANCE ON 64th STREET

WEST SIDE Y. M. C. A., NEW YORK
DWIGHT JAMES BAUM, ARCHITECT

UNIV. OF MICH.



STUDY OF MAIN ENTRANCE ON 64th STREET

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DWIGHT JAMES BAUM, ARCHITECT

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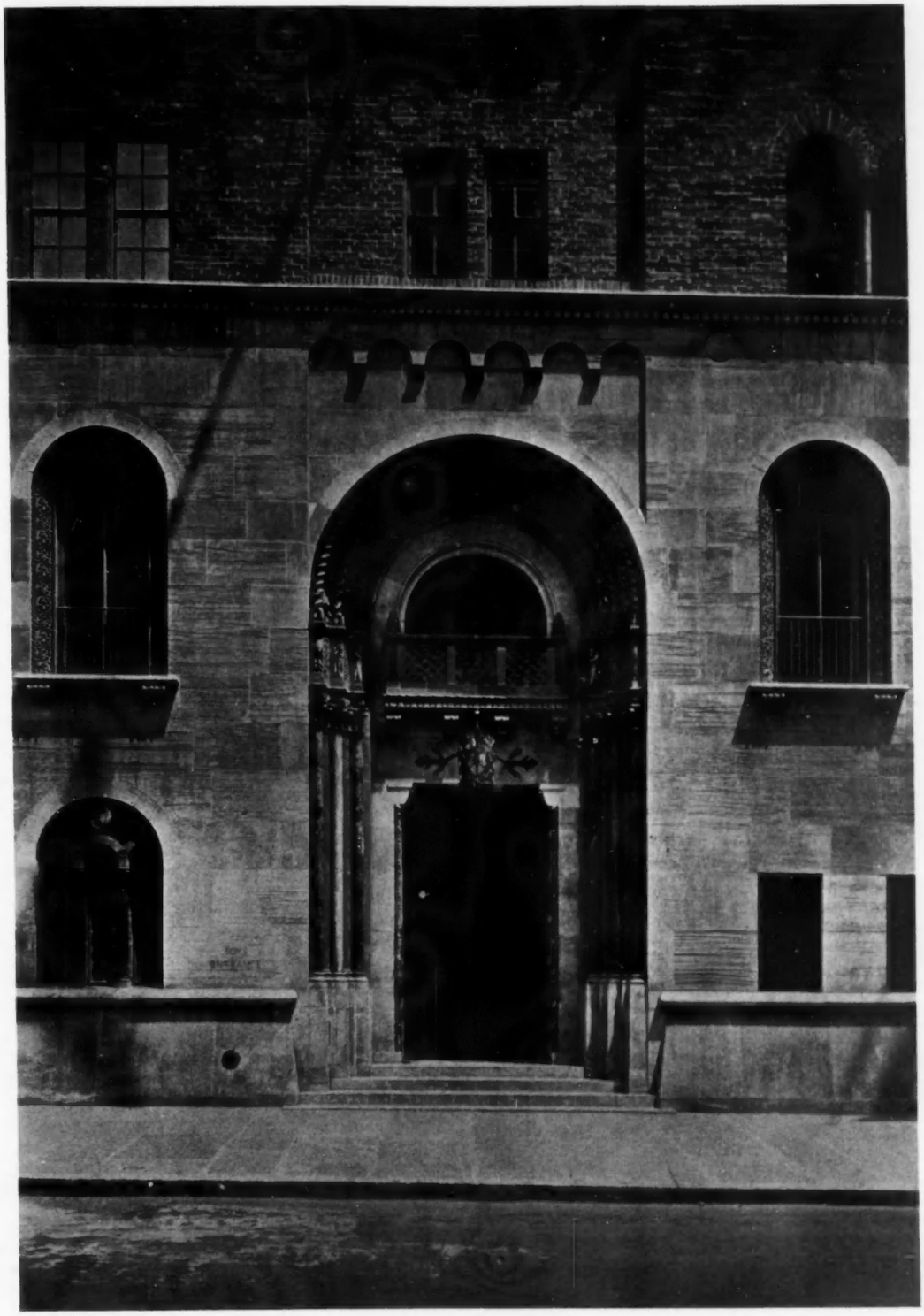
MEN'S ENTRANCE

WEST SIDE Y. M. C. A., NEW YORK
DWIGHT JAMES BAUM, ARCHITECT



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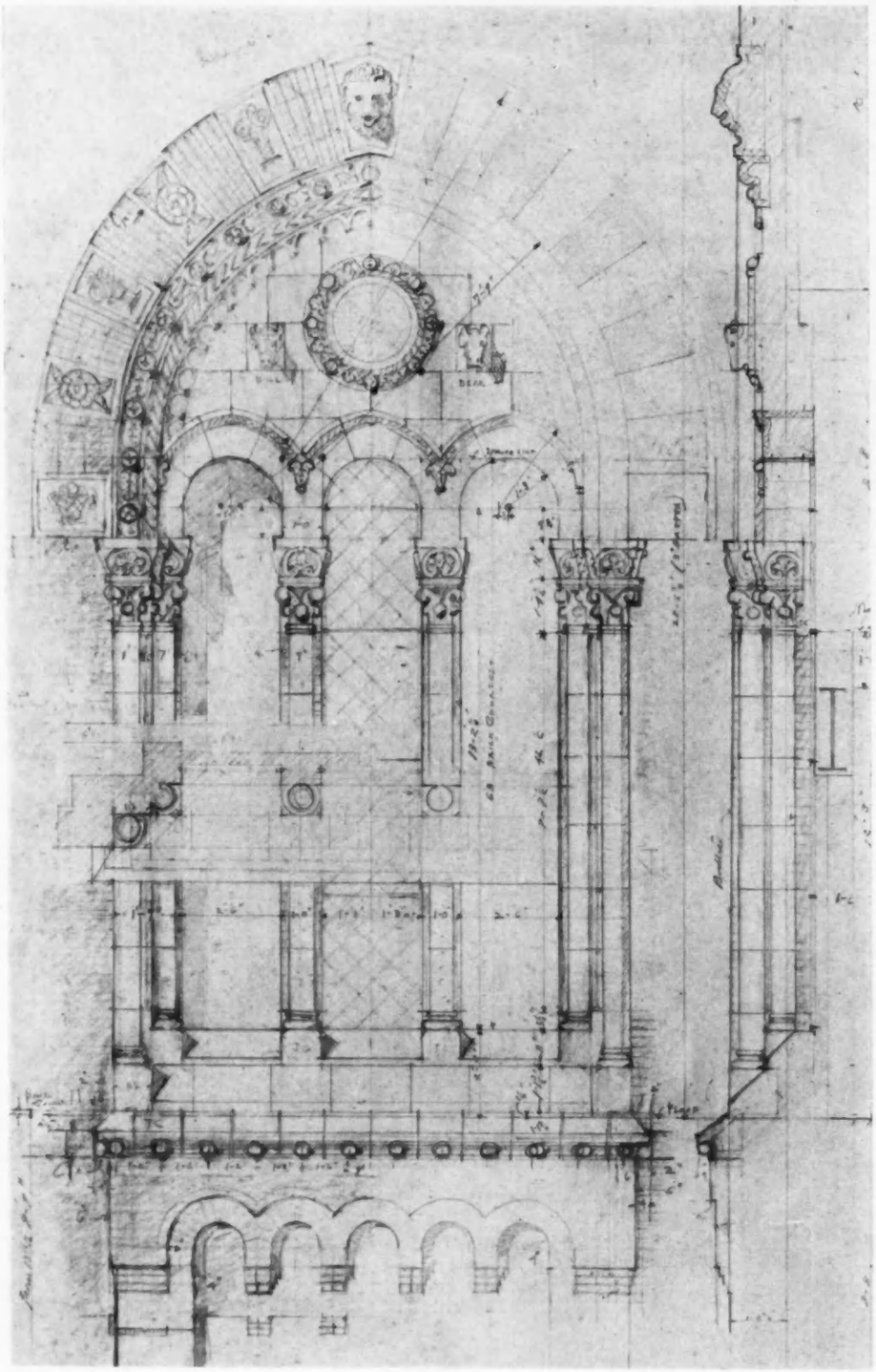
BOYS' ENTRANCE

WEST SIDE Y. M. C. A., NEW YORK
DWIGHT JAMES BAUM, ARCHITECT



EARLY STUDY, GYMNASIUM WINDOW

WEST SIDE Y. M. C. A., NEW YORK
DWIGHT JAMES BAUM, ARCHITECT

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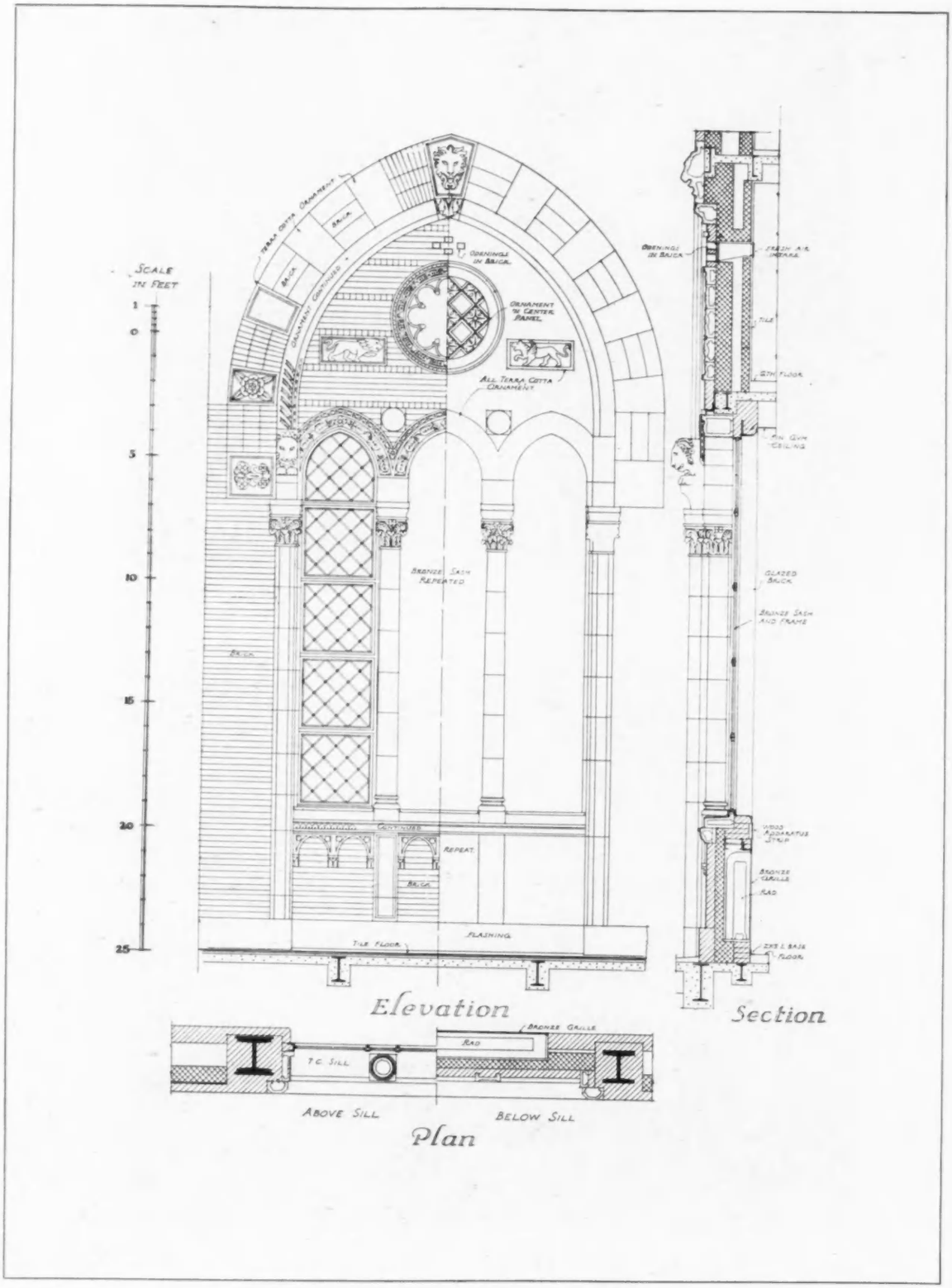
GYMNASIUM WINDOW

WEST SIDE Y. M. C. A., NEW YORK
DWIGHT JAMES BAUM, ARCHITECT



DETAIL, GYMNASIUM WINDOW, AS BUILT

WEST SIDE Y. M. C. A., NEW YORK
DWIGHT JAMES BAUM, ARCHITECT

ELEVATOR DOORS THROUGH ARCH IN
BASEMENT. BELOW, BASEMENT LOBBY

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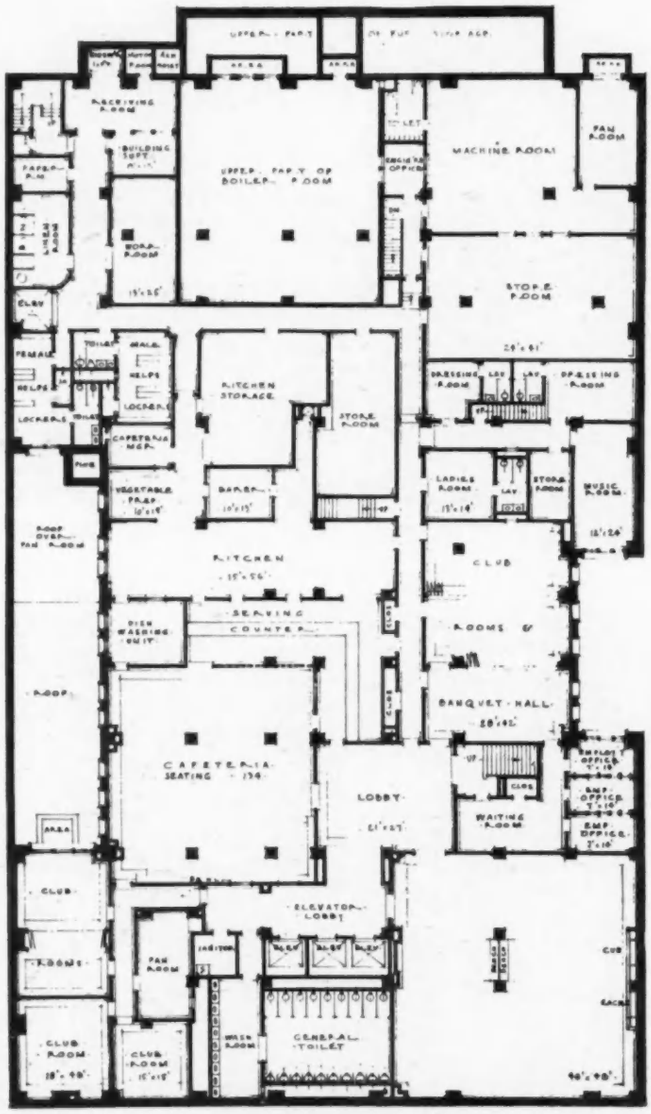
WEST SIDE Y. M. C. A., NEW YORK
DWIGHT JAMES BAUM, ARCHITECT

UNIV OF MICH



BASEMENT

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SOCIAL ROOM

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MEN'S SOCIAL ROOM

WEST SIDE Y. M. C. A., NEW YORK
DWIGHT JAMES BAUM, ARCHITECT

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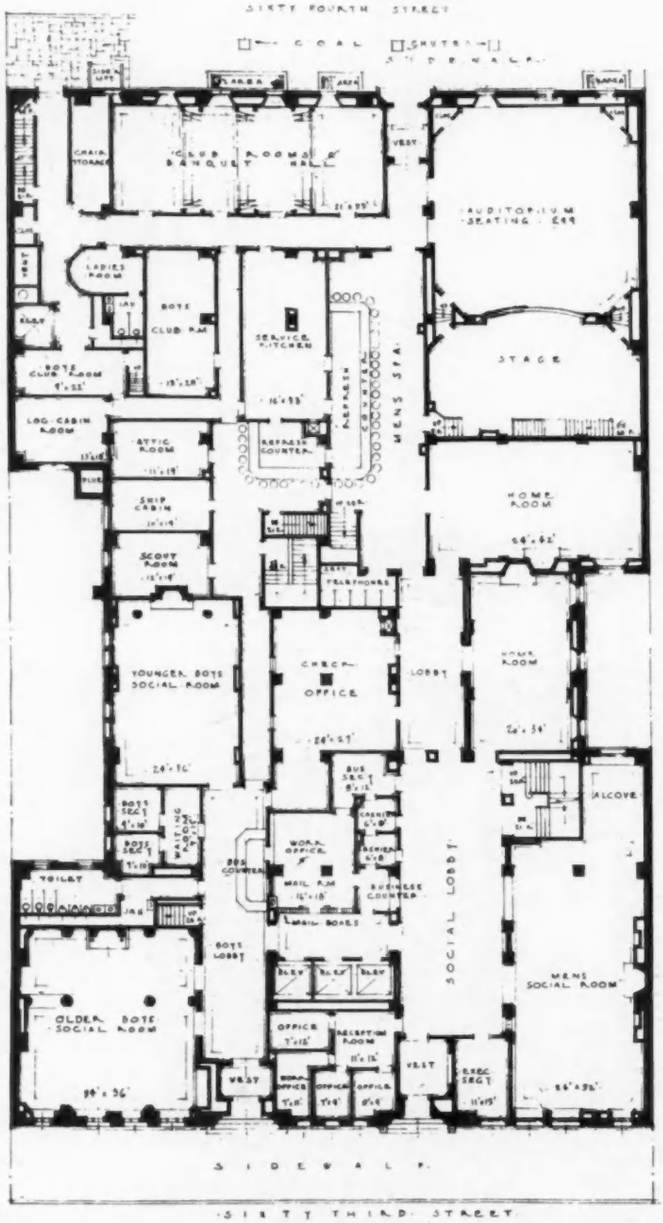
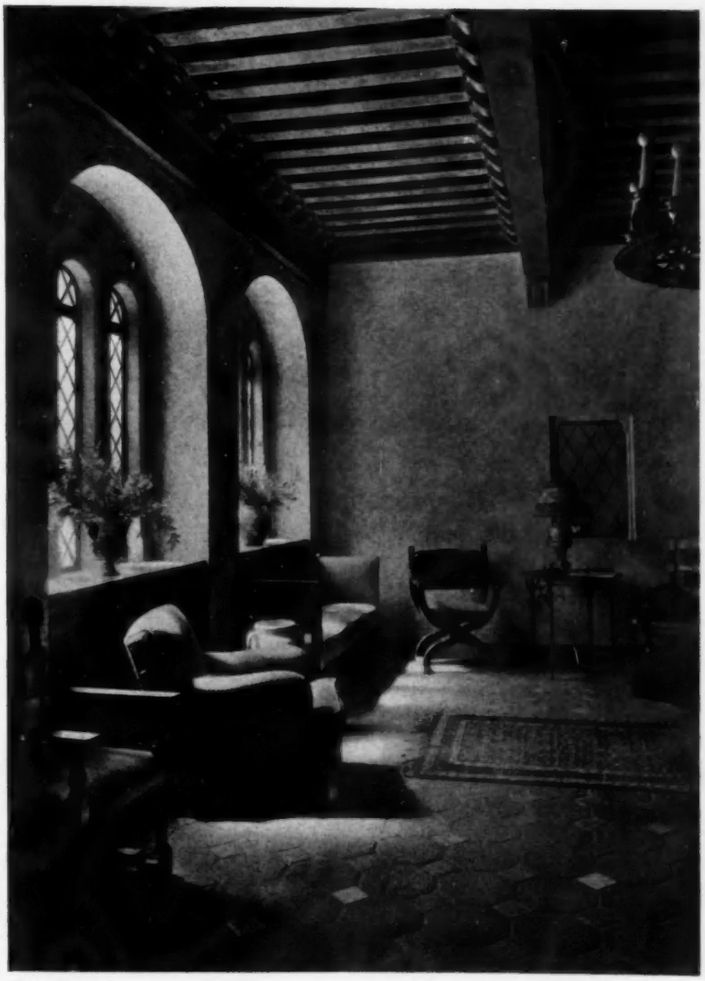


FIRST FLOOR

WEST SIDE Y. M. C. A., NEW YORK
DWIGHT JAMES BAUM, ARCHITECT

MONUMENTAL STAIRWAY WITH SPANISH TILE TREADS AND RISERS. BELOW, 63rd STREET END OF MEN'S SOCIAL ROOM SHOWING ARCHED WINDOWS AND DECORATED BEAM CEILING



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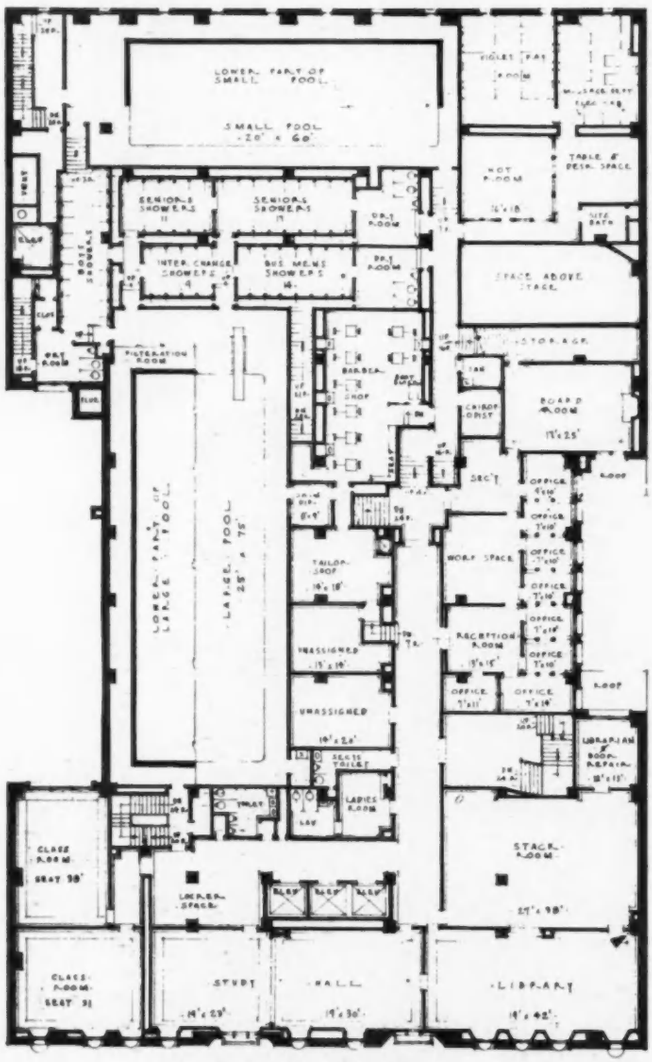
UNIV OF MICH



SECOND FLOOR

WEST SIDE Y. M. C. A., NEW YORK
DWIGHT JAMES BAUM, ARCHITECT

DOORWAY BETWEEN CAFETERIA AND BASEMENT LOBBY. BELOW, VIEW OF CAFETERIA

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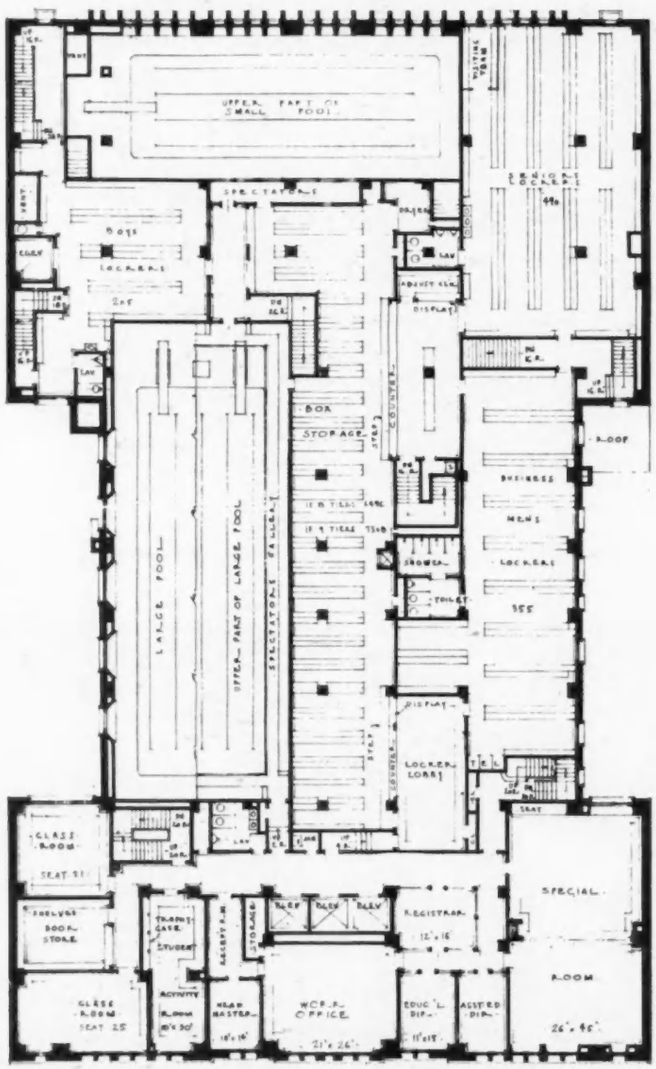

THIRD FLOOR

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DWIGHT JAMES BAUM, ARCHITECT

HOME ROOM

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HOME ROOM

WEST SIDE Y. M. C. A., NEW YORK
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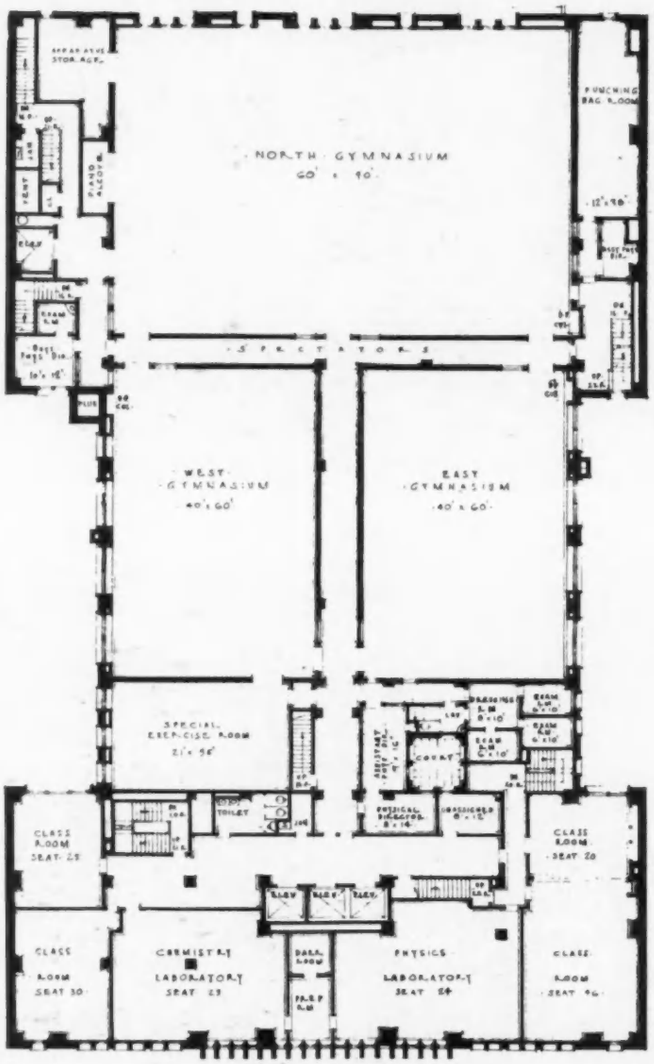

FOURTH FLOOR

WEST SIDE Y. M. C. A., NEW YORK
DWIGHT JAMES BAUM, ARCHITECT

LIBRARY. BELOW, FIREPLACE
IN OLDER BOYS' ROOM

WEST SIDE Y. M. C. A., NEW YORK
DWIGHT JAMES BAUM, ARCHITECT

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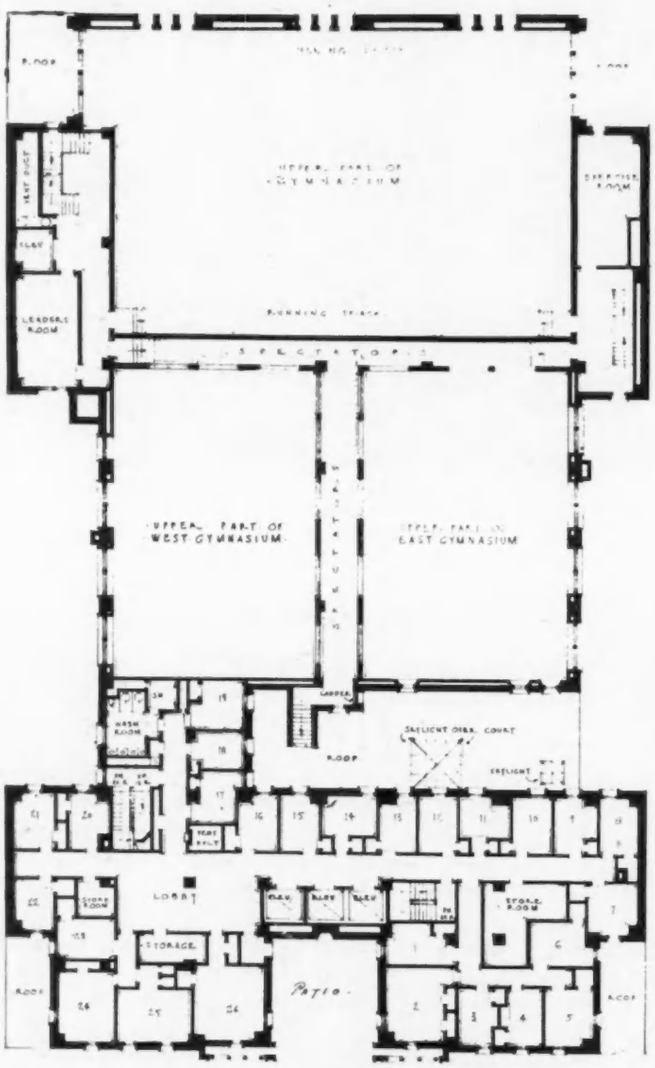
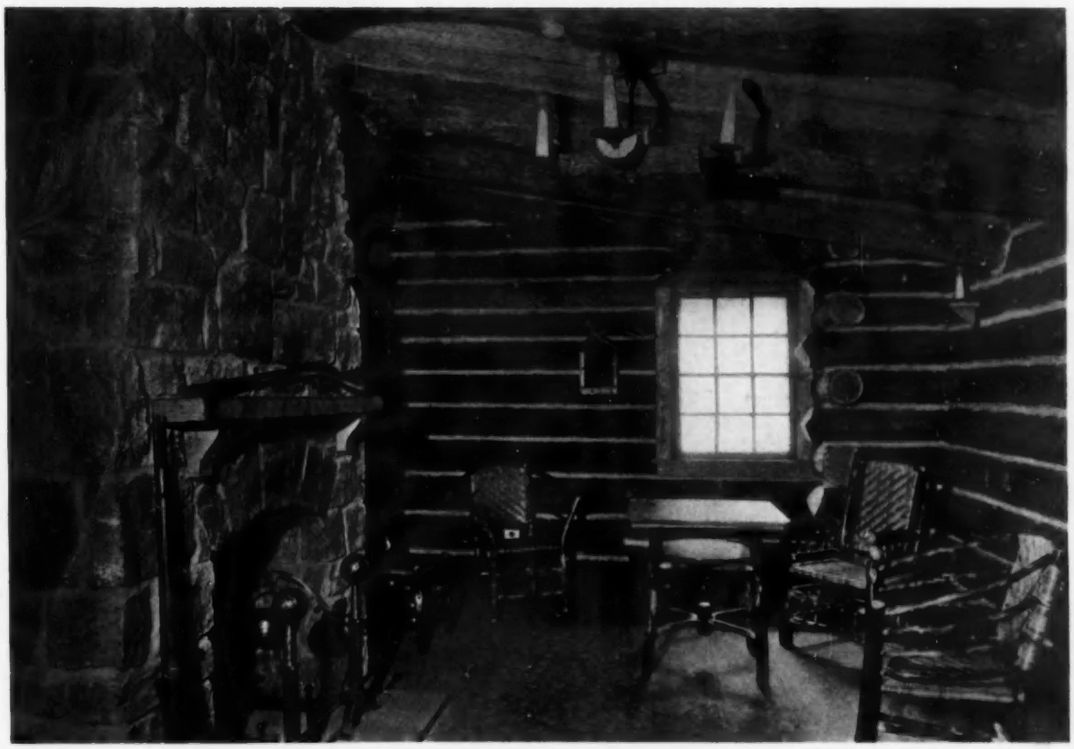


FIFTH FLOOR

WEST SIDE Y. M. C. A., NEW YORK
DWIGHT JAMES BAUM, ARCHITECT

SHIP ROOM



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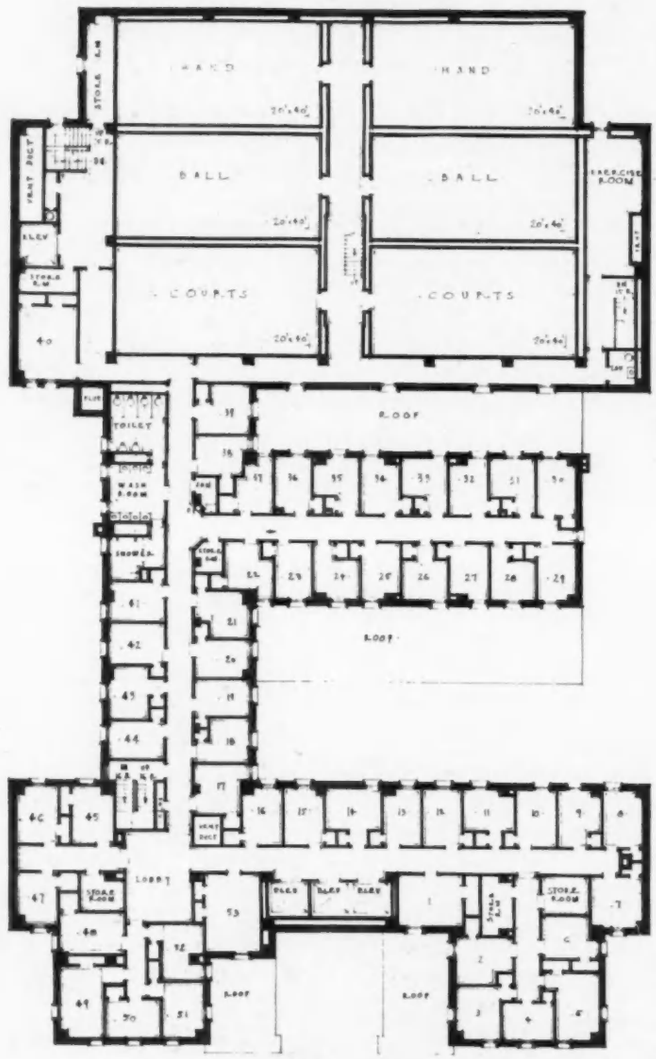
LOG CABIN

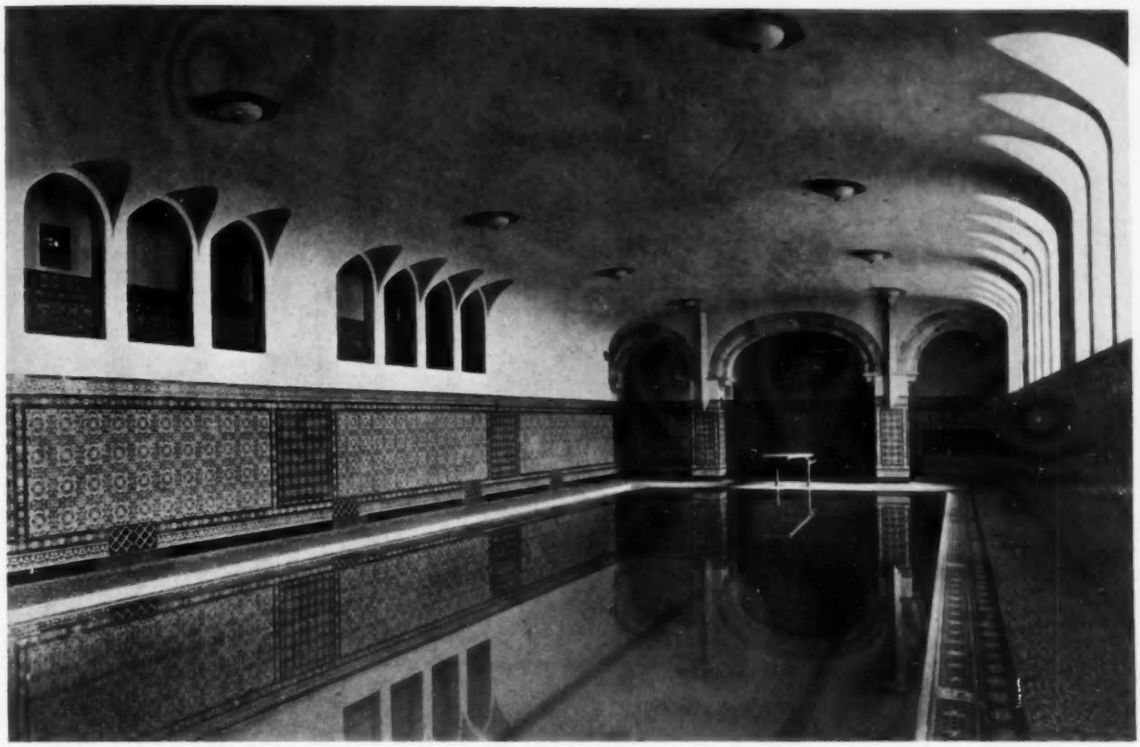
WEST SIDE Y. M. C. A., NEW YORK
DWIGHT JAMES BAUM, ARCHITECT

UNIV. OF MICH.



SIXTH FLOOR

WEST SIDE Y. M. C. A., NEW YORK
DWIGHT JAMES BAUM, ARCHITECT



ABOVE, BOYS' SWIMMING POOL. BELOW, MAIN SWIMMING POOL

WEST SIDE Y. M. C. A., NEW YORK. DWIGHT JAMES BAUM, ARCHITECT

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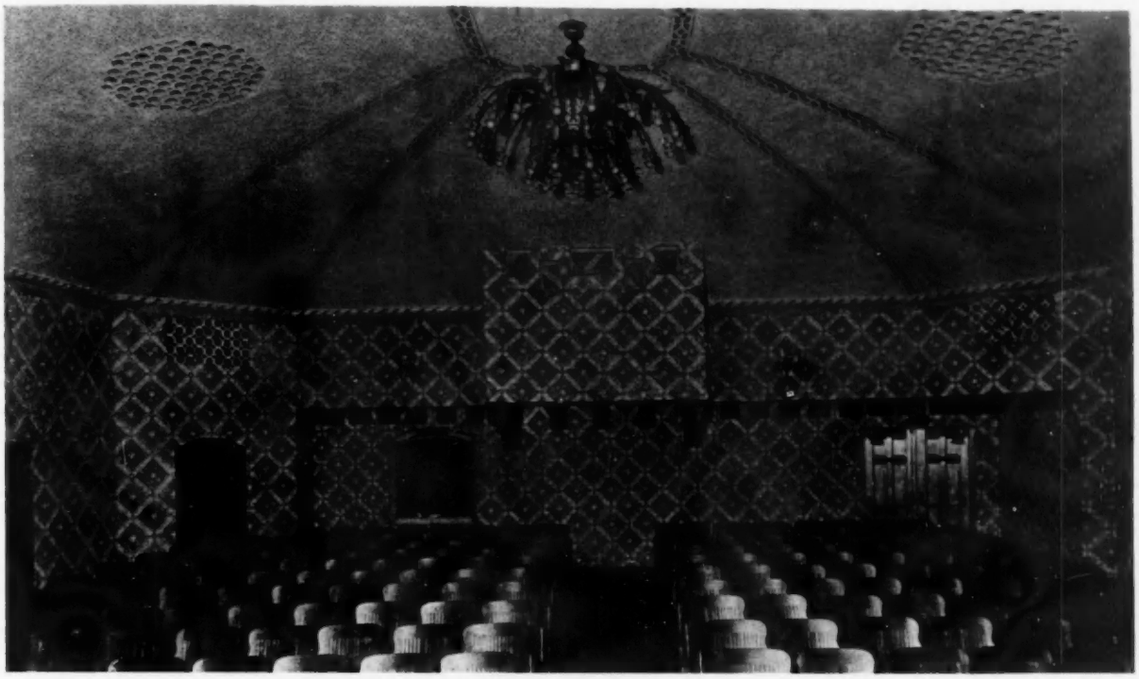
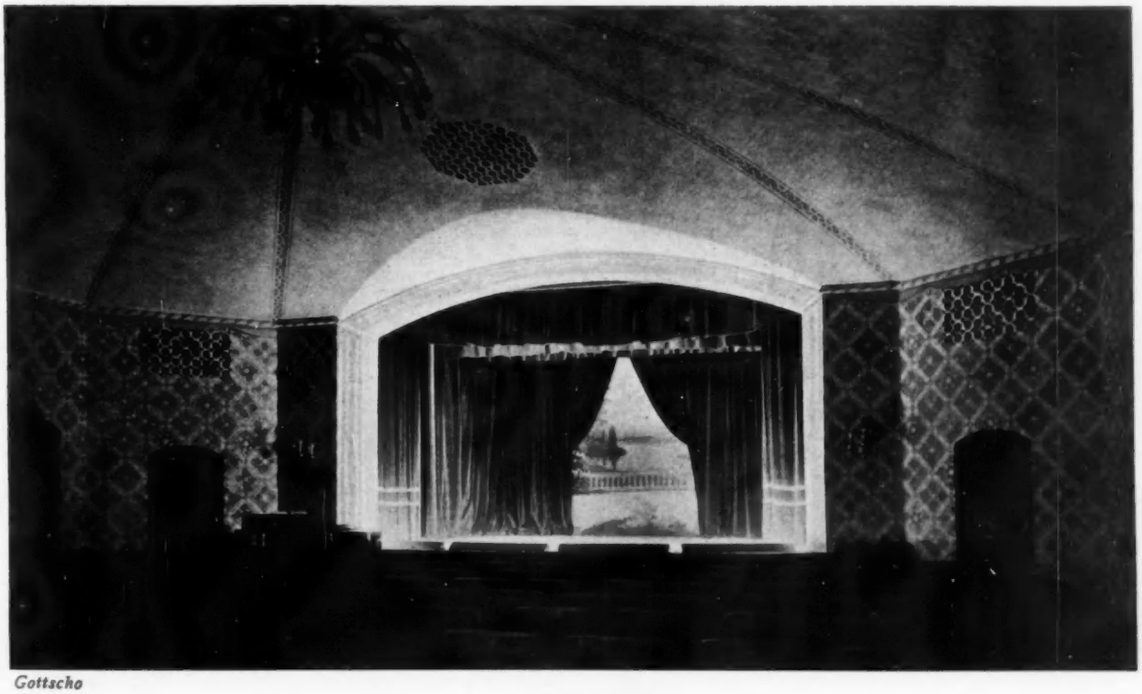
SEVENTH FLOOR

WEST SIDE Y. M. C. A., NEW YORK
DWIGHT JAMES BAUM, ARCHITECT



AUDITORIUM FROM STAGE



Gottscho

AUDITORIUM

WEST SIDE Y. M. C. A., NEW YORK
DWIGHT JAMES BAUM, ARCHITECT

UNIV OF MICH

EIGHTH FLOOR

WEST SIDE Y. M. C. A., NEW YORK
DWIGHT JAMES BAUM, ARCHITECT

THE ARCHITECT AND THE BUSINESS MAN

By ROYAL CORTISSOZ

IN the battle of the styles that is going on in American commercial architecture today, the clash of abstract principles is predominantly heard. Argument revolves around this or that critical hypothesis. Is the classical tradition played out? Has modernism come to stay? Where are the valid anchorages of taste? And so on and so on. All the time I observe that a curious indifference is shown by the debaters to a factor in the situation which one would think ought to have a leading role. I refer to that quantity known as mere human nature. Nominally it is remembered. At all events we hear a good deal about the necessity of making architecture expressive of "the spirit of the age." But is it actually that, in the case of the topless towers with their bare vertical lines, the damnable iteration of their windows, and the setbacks which all the designers draw out of much the same basket? I am far from denying it *in toto*. If there is anything obvious in American life it is our passion for standardization, and practicality is one of our fetishes. I need not labor the point, which is clinched, indeed, by the fact that, whether you like them or not, these dizzy structures look, somehow, "in the picture." Incidentally they flatter the national vanity. What a vivid sense they give us of the prosperity and efficiency of which we are so proud! But what does the business man, the occupant of, say, Room 5682, think of it all?

A widespread assumption is, I think, that he is tickled to death. He likes to be made comfortable, and for the sake of that he is willing to adopt a state of affairs suggestive of the regimentation of the hosts in one of H. G. Wells' prophetic books. When he is at work he wants conveniences, not distractions. He needs no tokens of beauty to "wash his eyes," but is content with a prospect "long and lank and brown, as is the ribbed sea sand." His requirements are met by a glass-topped desk, a telephone, and a row of push buttons.

Well, I maintain that to assume all this is, possibly, to take too much for granted. For my own part, I have not once but on numerous occasions found the man of affairs in effective rebellion against this "spirit of the age." I have visited a banker who had an Oriental rug on his floor; a tapestry as well as pictures and prints on the walls; bookcases, and even casual little tables, more ornamental than useful. On the desk he used, a beautiful antique, a glass top would have been an abhorrent thing. I remember another suite of "offices," Georgian in style, in which everything from the fireplace furniture to the window hangings was eloquent of the exquisite taste of the owner. In still another, high up in the heavens, one was enveloped in the charm of the Italian Renaissance. Over and over again I have found the business man thus flinging his protest against the bogey of hard-boiled efficiency, and I am morally certain that my experience could be multiplied into thousands, all over the country. Work has not stripped the human being of his natural predilections. He lives in a gracious, civilized environment, in city or country, and when he settles down to his day's labor he instinctively seeks to carry over into it something of the amenities he knows at home. Yet it is taken for granted, I repeat, that he is satisfied with drab "practicality" and that he glances with a complacent eye at the unlovely facade behind which he carries on his activities.

Do I exaggerate? Do I, in my turn, assume too much? Let us cite a representative witness from the "modern" side, Mr. Raymond M. Hood. He lectured at New York University in February on "The Attack of the Problem," and, according to my friend Saylor, in *Architecture*, who was present on the occasion, Hood took issue with me for having said, in effect, apropos of certain buildings in the last League show, that they were well adapted to the needs of the occupants, that they were well constructed, that they met every practical consideration,—but were they art? Saylor's report continues: "Hood's attitude is that if they are all these things, we have nothing further to worry us. He described in detail the problem of *The Daily News* Building, now nearly completed in New York; how every facet of the problem was controlled by some practical consideration. No office space could be farther than 27 feet from outside light. Windows were established at 4 feet, 4 inches width (if larger, women employes cannot handle them; if smaller, they do not take advantage of all the light). The net rentable area of the building had to be at least from 65 to 70 per cent of the gross area. All those and many more such practical matters having been met, *the architect's work was ended. No further attempt was made to make it beautiful nor to put ornament upon its essential skeleton.*"

The italics are mine. I use them to emphasize what seems to me an extraordinary abdication, extraordinary, and, to my mind, fantastically unnecessary. The practical program indicated here is no doubt, perfect—in the words of Swinburne, "perfect as the big round tear of a child." But why, with the program fulfilled, was the architect's work ended? Why should he have made no further attempt to import beauty into his mechanism? The answer, I suppose, is that the mechanism has, by itself, a beauty of its own. But I wonder if that human creature, the business man, who is often as romantic and imaginative as an artist, developing transactions that encircle the earth, thinks so, too?

If I doubt it, it is not by the simple process of just thinking so, but in the light of a good deal of evidence, from which I may select one outstanding example, the work of York & Sawyer. The world of finance is not precisely a poetic world, but that beauty may flourish in it is decisively shown by the bank buildings of that firm. I have explored one of them after another, in New York and as far afield as Montreal. Wherever they happen, they give to an impeccably efficient mechanism (and what could be more "practical" than the functioning of a bank?) an investiture of fairly opulent beauty, in doing so, it must be remembered, not only from the promptings of their own *daemon* but with the approval of hard-headed boards of directors. These buildings are of today, if any buildings are, yet when their "essential skeletons" were framed the work of the architects was not ended. On the contrary, they went on to clothe the skeletons in Roman magnificence. I know. The problems of the Bowery Savings Bank, say, and those of *The Daily News* Building were not exactly similar. But I feel, invincibly, that at bottom they made the same demand upon the designer, to give beauty its chance. There are some architects, of course, who will disagree with me, and, I dare say, some business men. But I surmise that there are other business men and other architects who will be with me.

ROYAL CORTISSOZ

BEAUTY IN ARCHITECTURE

By RAYMOND M. HOOD

WHEN Burke condemned the annihilation of the French nobility with never a word about the misery of the peasants, Tom Paine retorted: "You pity the plumage, but you forget the dying bird." I might almost say the same thing to Mr. Cortissoz.

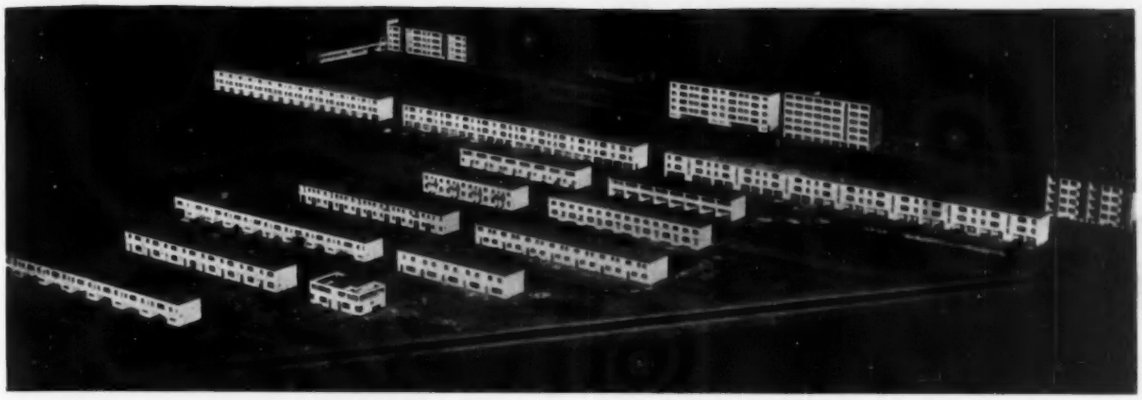
In the foregoing article he has described delightfully the office of the old fashioned business man, the gentleman of the old school, who arrived at his office at eleven and left at three. The man of affairs who back in the nineties wore a high silk hat, carried a gold headed cane, rode to his business in a brougham behind bays, and wanted in his private office the exclusive atmosphere of his Fifth Avenue mansion. His wealth and his position too often rested on the labor of his many employes, just as the leisure and luxury of the pre-war Southern colonel depended upon the number of his slaves and the acreage of his plantations. Those picturesque and romantic days have gone, together with the square-rig clipper, the side-wheel steamboat and the coach and four. Then an architect was only an artist who designed to please ambitious clients. Well planned, practical interiors were sacrificed to carefully balanced ornamental exteriors. Even these highly dignified, traditionally correct designs were frequently for one facade only. It was the period of "Queen Anne fronts and Mary Ann backs." It was two-dimensional architecture, elaborate stage-sets for street fronts, sham architecture, which never rang true, but was appropriate to and consistent with the civilization of that period. Why not call it the "Veneer Period?" For then our culture and our intellectuality, like our architecture, were largely a very thin veneer.

Today all is changed. We live in an age founded upon industry and developed by science. It is an age when every man pulls his own weight in the boat. Today the architect must build for the man whose ideal is not to be a member of a parasite aristocracy. He must build to suit the requirements of exacting business efficiency. A commercial building is a financial investment. It is built not only to properly house business, but also to show as large a return as possible on the investment of its owners.

Mr. Cortissoz deplores standardization. He speaks of the "damnable iteration of windows and set backs drawn out of the same basket." What does this exacting critic expect? Does he think that the efficiency of a building to house countless large and small offices, the size and arrangement of which will change from year to year, should be sacrificed to a less uniform size and arrangement of windows? Can he find no pleasure in the repetition of similar shapes? In his devotion to classic architecture does he object to the repetition of identical columns? And doesn't the recent architecture in New York show the elasticity of the Zoning Law and the Multiple Dwelling Act? Can Mr. Cortissoz name two recent buildings having an identical arrangement of setbacks? The "basket" of which he speaks must be as magical and as imaginary as Aladdin's carpet.

Mr. Cortissoz has done me the honor of quoting a few figures from the informal talk I gave last winter at New York University,—figures established from years of practical consideration of the problem of designing an efficient office building. He is exact in stating my figures, but he is inexact in stating my attitude. He mentioned in regard to the *Daily News* Building that I had said that "after the practical problems had been met, the architect's work was ended, and that no further attempt was made to make it beautiful nor to put ornament upon its essential skeleton." As I gave my talk without notes, I cannot question the accuracy of this quotation. It is not, however, what I intended to say. Great care was taken and much study was spent on the proportions of the masses, and the location and relative height of the set backs of the *News* Building. The brick was selected for color as well as for quality. The spandrels between the windows were designed to give a vertical rather than a horizontal character to the building. But these things were done where I knew they would not exact a sacrifice in utility. In straightforward simplicity of design may there not be a subtle beauty, even if I did not achieve it here? Would purposeless cornices, bas-reliefs and balustrades have added any beauty to the design? I do not think so. The hundred and fifty odd thousand dollars I was allowed for architectural effect could at best have been but thinly spread over the four facades of the building. It seemed more logical to spend this money in beautifying the main doorway on 42nd Street, and the great entrance lobby, a hall forty by forty by fifty feet. Here was carried out a very colorful and unusual decorative treatment, seen at every hour of the day by the thousands who enter and leave this great beehive of journalistic and commercial enterprise. How much better it seems to me to place the decorative features within the visual reach of man. So in conclusion I am going to ask Mr. Cortissoz to do me the honor of visiting the *News* Building when the great entrance hall is opened next week, and perhaps utilize his facile and pleasant pen on his impressions of the completed building, instead of on his erroneous idea of my attitude toward beauty in commercial architecture.

RAYMOND M. HOOD.



Model of the Karlsruhe-Dammerstock Development

THE DAMMERSTOCK HOUSING DEVELOPMENT

"THE HOUSE FOR PRACTICAL USE"

BY

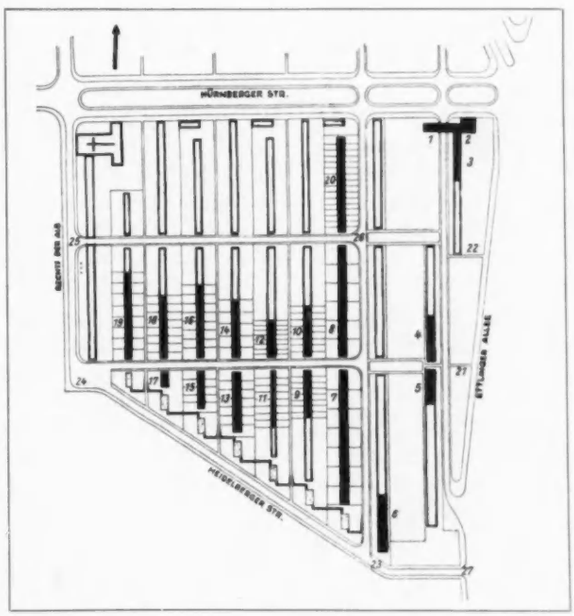
ISE GROPIUS

NOTE: The methods used by the Germans in designing and constructing their recent housing projects are well worth considering. Evidently they analyzed the problem by determining a minimum that is consistent with the requirements for space, light and sanitation which were incorporated in the plan arrangements and placement of the utilities and domestic equipment for comfort, convenience and practical use. It was necessary to exercise the utmost economy in labor and materials because the funds available for these projects were very limited. These facts must be kept in mind when studying the German housing projects.

A noticeable feature of these industrial housing projects is the use of fire-resistive construction, which is unheard of in ordinary American housing or even in our most expensive residences, and in high class apartment houses of a limited height. American architects have yet to seriously consider and develop fire-resistive residential buildings of ordinary size. Can we afford, for our own benefit, to ignore this European challenge to our ability to build economically ordinary fireproof structures?

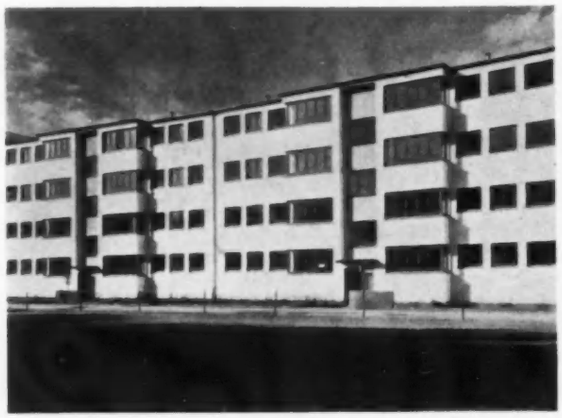
The plans are very compact, eliminating space that is not intensively used, and it is doubtful whether, with all of our wasteful space and spacious effects which we affect in our ordinary residential buildings, we have greater privacy, comfort and convenience than are provided in these compact dwellings.

The exteriors of these structures are severely plain and possibly repugnant to the American conception of a dwelling. Primarily, exterior walls serve as effective protection against the elements, and their ornamentation is a matter of custom or fashion. Although maximum economy of construction cost made it necessary to strip these buildings of all useless ornamental appendages, it is possible to make them attractive in the color of the stucco finish, the window shades and the flower boxes. Individuality, sufficient for the ready identification of a unit, can be provided without a material increase in cost. The utilization of the flat roof can well attract our favorable attention.



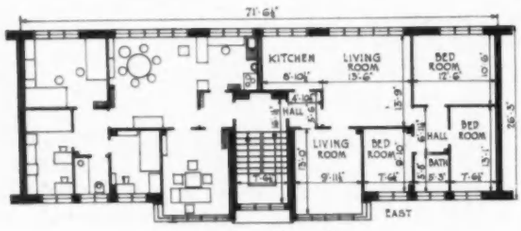
Plot Plan, Karlsruhe-Dammerstock. Numerals Indicate Groups

The Karlsruhe-Dam-

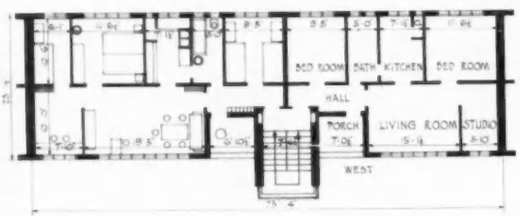


Group 4. West Elevation
Riphahn and Grod. Architects

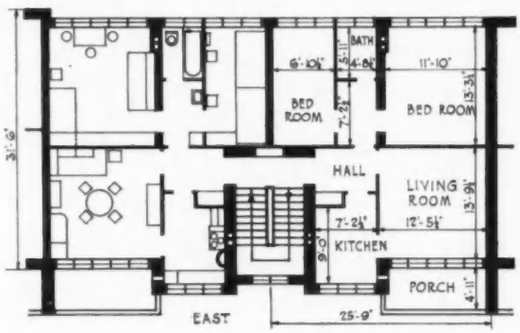
Group 5. West (Rear) Elevation
Walter Gropius, Architect



Group 4. Floor Plan



Group 3. Floor Plan



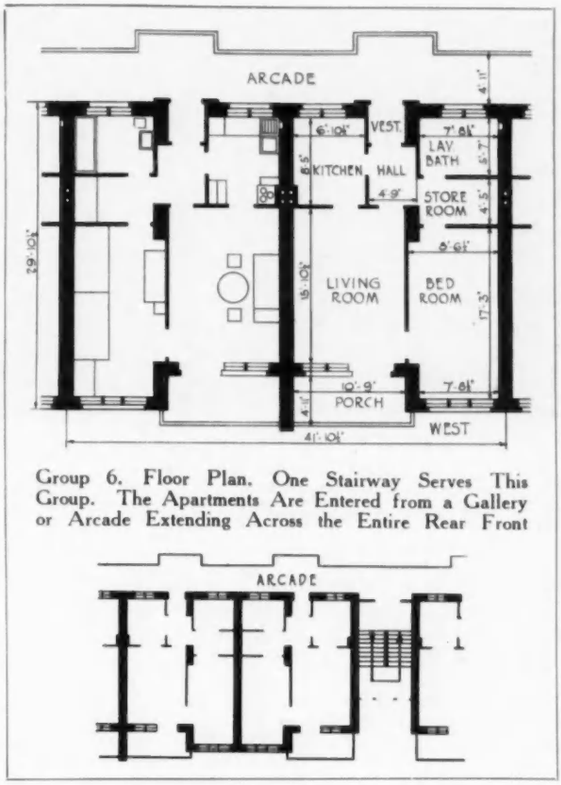
Group 5. Floor Plan

See Text Reference on Page 191 to Groups 3, 4 and 5. Note "Penthouse" Rooms and Roof Gardens in Group 5. Otto Haesler is Architect for Group 3

merstock housing development is unique in that a specification of general requirements was prepared by Prof. Gropius, and the various groups of houses were designed by eight architects. This scheme entailed a certain uniformity that insured the desired quality and the important objective of the "house for practical use." THE ARCHITECTURAL FORUM is fortunate in presenting this important housing development preliminary to others of like nature.

THE Dammerstock housing development, near Karlsruhe, Germany, was completed in September, 1929. The procedure employed, as to engaging architects, was unusual. Prof. Walter Gropius was retained to prepare the general plot plan, designate the locations of the different types of buildings and provide a specification of standard requirements for the buildings. This general set-up was made to secure a reasonably harmonious character of the development and insure a minimum of cost. To each one of eight architects, including Prof. Gropius, a certain portion of the work was assigned. Each was free to solve his individual problems in his own way, subject only to the limitations of the general scheme. It was not intended to duplicate the housing exhibitions at Stuttgart or Breslau, but rather to combine the best and most modern ideas of building construction in a realization of *"Die Gebrauchswohnung"* or "the house for practical use." The objective was to provide houses that are suitable for the average family.

PLOT PLAN. The buildings are located in north and south rows, providing east and west exposures. The rows of four-story apartment houses are placed along the eastern side of the tract and serve as a barrier to prevent the noise and dust from entering the principal highway reaching the interior of the tract, which is



Group 6. Floor Plan. One Stairway Serves This Group. The Apartments Are Entered from a Gallery or Arcade Extending Across the Entire Rear Front

Group 6. West Elevation
Walter Gropius, Architect

occupied by two-story houses. These higher buildings also give a more impressive appearance to the principal approach to the tract. The apartment houses face and are served by two ordinary streets. Vehicular traffic within and through the tract is confined to two east and west streets, and the north and south rows of houses are served only by main sidewalks 6 feet, 6 inches wide leading from these streets. The houses face these main sidewalks and are connected with them by narrower walks leading from the entrances. There are no traffic sidewalks at the rears of the houses. The flower gardens and lawns are between the houses and the main sidewalks, on both sides of which are trellises for vines. The vegetable gardens are located back of the houses. It will be noted that the intention is to reduce to a minimum the disadvantages caused by traffic.

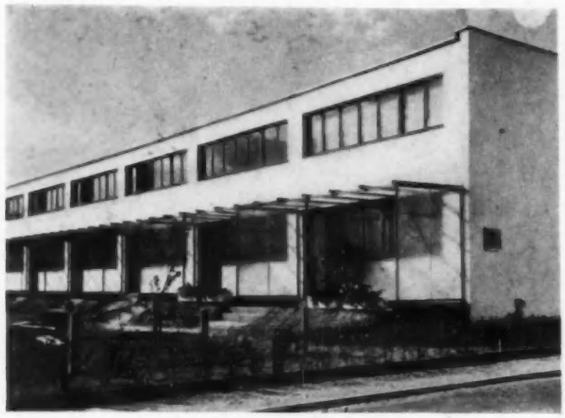
EXTENT OF HOUSING. The tract of land was of sufficient area to provide for a total number of 750 individual homes, either in apartments or houses. The entire number has not so far been erected, the first section of the construction being limited to 228 apartments, for which 23 different plans were used. In these, the rentable areas range from 527 to 882 square feet in the two- and five-room apartments, and from 613 to 1,184 square feet in the three- to six-room one-family houses. The number of rooms is limited to living, dining and bedrooms. The monthly rent for the apartments ranges from $12 to $22, and from $18 to $34 for the one-family houses. The 228 apartments built contain 866 rooms and are apportioned:

Rooms per apartment	2	3	4	5	6
Number of apartments	32	46	102	32	16

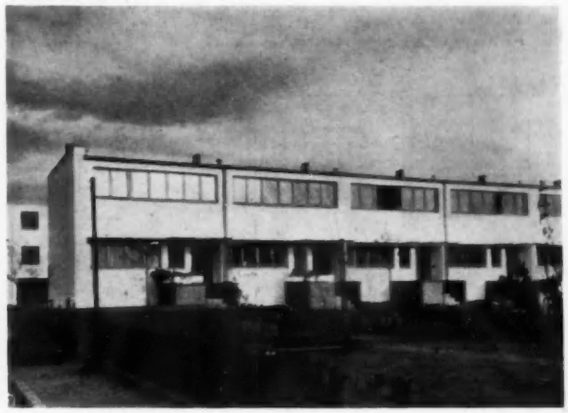
GENERAL REQUIREMENTS. For purposes of securing economical construction and a harmonious and consistent appearance of the buildings, a schedule of general requirements was provided for the eight architects who participated in the planning of the buildings. As the practicability of the house depends upon its plan, general dimensions and the domestic and sanitary equipment, Prof. Gropius formulated a specification for these items which also were included in the general requirements.

STRUCTURE. (1) Flat roofs, (2) uniform story heights and (3) equal window units for single or multiple windows, the units being each 21 inches wide and from 42 to 51 inches high.

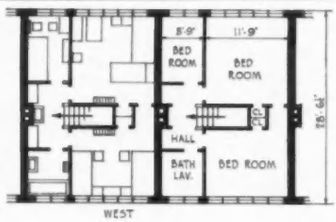
GARDENS. Uniform gardens and flower-box equipment for all porches, balconies, terraces and roof gardens.



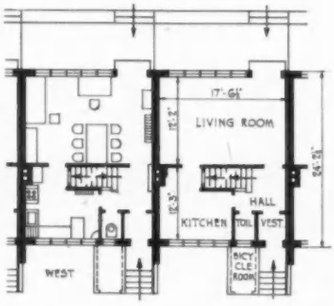
Group 9. East (Rear) Elevation
Walter Gropius, Architect



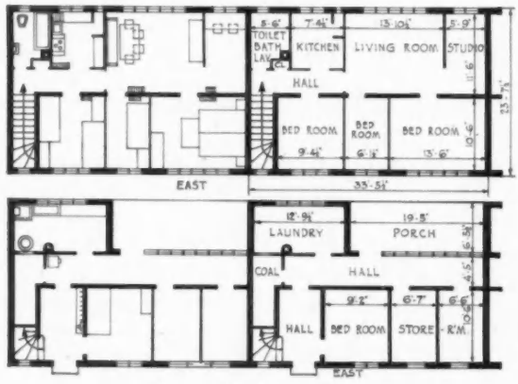
Group 9. West (Front) Elevation
Walter Gropius, Architect



Group 9 (left).
Floor Plans



Group 19 (below).
Otto Haesler, Archt.
Bedrooms on east front, recessed porch on west front



Group 19. Floor Plans

HEATING AND PLUMBING. Central plant for heating and hot water service for apartment houses, and individual heating plants and hot water service for one-family houses. Central laundry for the apartment houses, the laundry having drying racks, glass-covered outdoor drying places and individual wash rooms. The one-family houses have individual laundries, and each bathroom has lavatory, water closet and tub. The tub is usually built in on two or on three sides. Cooking is to be done with gas only.

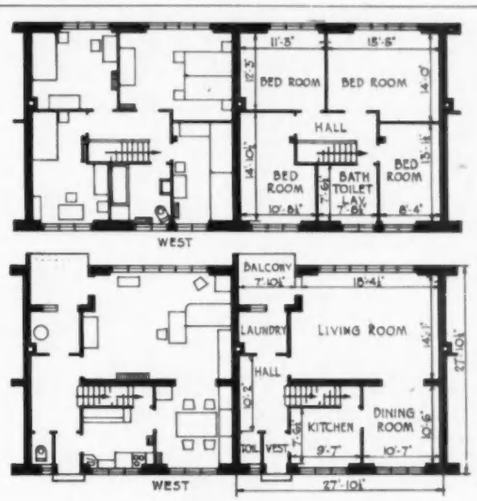
PLAN LAYOUT. Kitchens to have doors leading to halls and living rooms. Sizes of kitchens not less than 53.8 square feet for the small and 64.5 square feet for the larger apartments. Communicating doors between parents' and children's bedrooms. Closets for overcoats, hats and umbrellas, and conveniently located rooms for bicycles.

DETAILS. Gas and electric meters located so as to be accessible for reading without entering the apartments. Combination mail boxes at main entrances. Linoleum on all concrete floors. Plain stock doors with steel frames. Kitchen equipment arranged for maximum convenience eliminates all unnecessary legs, using built-in furniture where possible. Kitchen fixtures to have heights as specified. Electric base receptacles in living and bedrooms. Curtain rods for single and double curtains. Peep-holes in entrance doors.

ASPECTS OF ROOMS. It is customary in Germany to have the bedrooms on the eastern side and the living rooms on the western side of the house. The principal highway at the Dammerstock site is on the east side, and although the houses are separated from it by a comparatively wide space, the noise of passing automobiles is audible. Consideration had to be given as to the relative importance to the average tenant of absolute quiet at night in the bedrooms or the afternoon sunlight in the living room and balcony which are generally occupied at this time of the day. The problem was solved differently in the three apartment houses shown. Haesler and Riphahn and Grod chose the east side, and Gropius chose the west for the bedrooms.

The Furnishings for These Rooms Are Selected for Their Simplicity, Durable Construction and Comfort. The Convenient Arrangement of the Furniture is Shown on the Plans

APARTMENT HOUSES. Comparing the different plans for the apartment houses, the question arises as to the importance of having access to all of the rooms from the hall. Other advantages, however, may compensate for not adhering to such an arrangement. Riphahn and Grod, in their five-room apartments, connect only the two living rooms and kitchen directly with the main hall. The bedrooms and bathroom open into a secondary hall which connects with the living room. Apparently, this arrangement has no disadvantages. Gropius provides direct access to all rooms from the main hall, satisfying a popular demand. Haesler presents an entirely different solution of the problem. The longer side of the living room is along the exterior wall with a sizeable and separate work or study room adjoining. This plan provides the maximum of light and ventilation in the living room. Objection might be made to using the living room as a passageway from the bedrooms to the bathroom. To overcome an existing aversion to apartment houses, Prof. Gropius provided balconies with flower boxes, a roof garden, and children's play rooms on the ground floors. These features, along with the liberal use of trellises for vines, give the apartments a cheerful appearance.



Group 13. Floor Plans
Alfred Fischer and Walter Merz, Architects

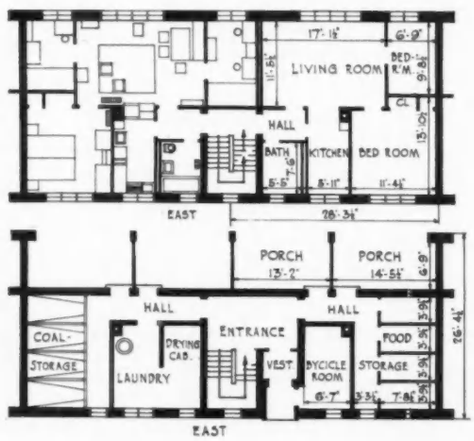
Group 11.
Floor Plans.
Fritz Roessler,
Architect

ONE-FAMILY HOUSES. It is conceded that certain economic disadvantages appertain to the one-family house as compared with the apartment house, and hence a really economical solution of the one-family house problem is difficult to produce. The one-family house has, however, one great advantage in the close connection between the house and the garden. This feature is possibly the deciding factor in the purchase of a house. A number of the houses in Dammerstock have only storage rooms and porches on the ground floors with the main rooms on the two upper floors. This necessitates housekeeping on three floor levels, with the attendant increased stair climbing, which deprives the occupant of a great advantage of the apartment house. The plans of Lochstampfer and Gropius take cognizance of this feature.

The "House for Practical Use," Which Was the Keynote of this Development, Is Exemplified in These Compact and Convenient Kitchens

SPECIAL FEATURES. The separation of the bath tub and water closet in one room from the lavatory room by a frosted glass partition seems practical. The location of the wash tub in the very small furnace room should be avoided. At least one of the children's bedrooms should be large enough for two beds rather than for each room to be large enough for only one bed. The frequently discussed "serving window" (*"Speisedurchgabe"*) between the kitchen and living room has been used only once. The future tenants of the houses very rarely will be able to employ domestic servants, and the serving window means rather a complication, especially if it replaces the direct door between the kitchen and living room. The furnishing of clothes line hooks has been generally neglected.

The kitchens are completely furnished, in this particular project, with built-in kitchen appliances wherever possible. This renders it possible for the area of the kitchens to be confined to from 52 to 98 square feet, which makes available more area for the other rooms. The folding table without legs is most generally used. The use of tile instead of wood for drain boards has been criticized as a possible source of unnecessary breakage of dishes. Kitchen cupboards having shelves more than 10 inches deep are criticized as being unsatisfactory for convenient use.



Group 8. Floor Plans. Franz Roeckle, Architect
Four-Family Houses with Ground Floor Utility Rooms and Porches

Some of the apartments and houses were furnished by the contractor. The furnishings in some instances, in spite of certain advantages, were too elaborate for the simple apartments.

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FACADE

INTERIOR OF THE BANKING ROOM

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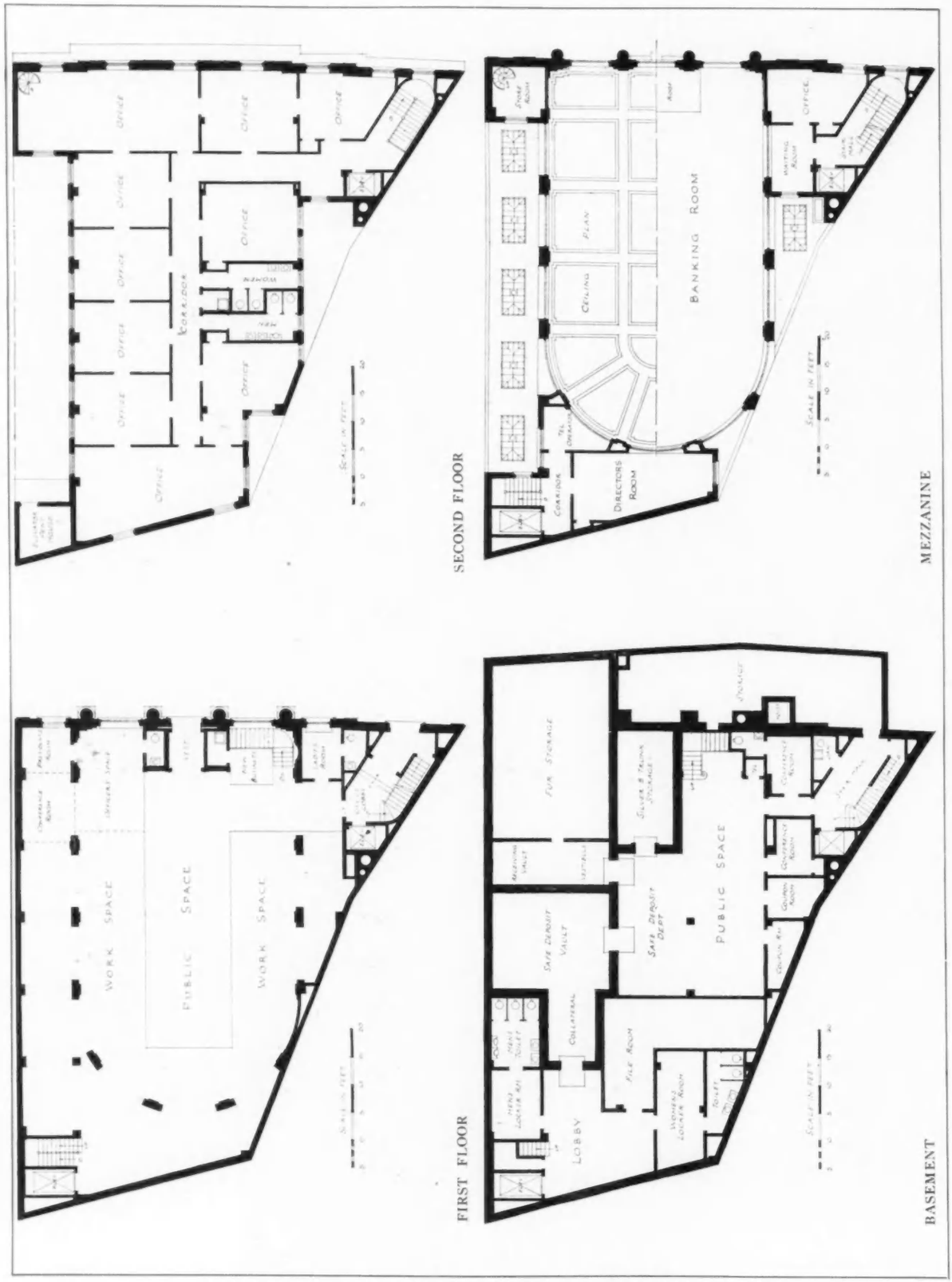

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DETAIL OF MAIN FACADE

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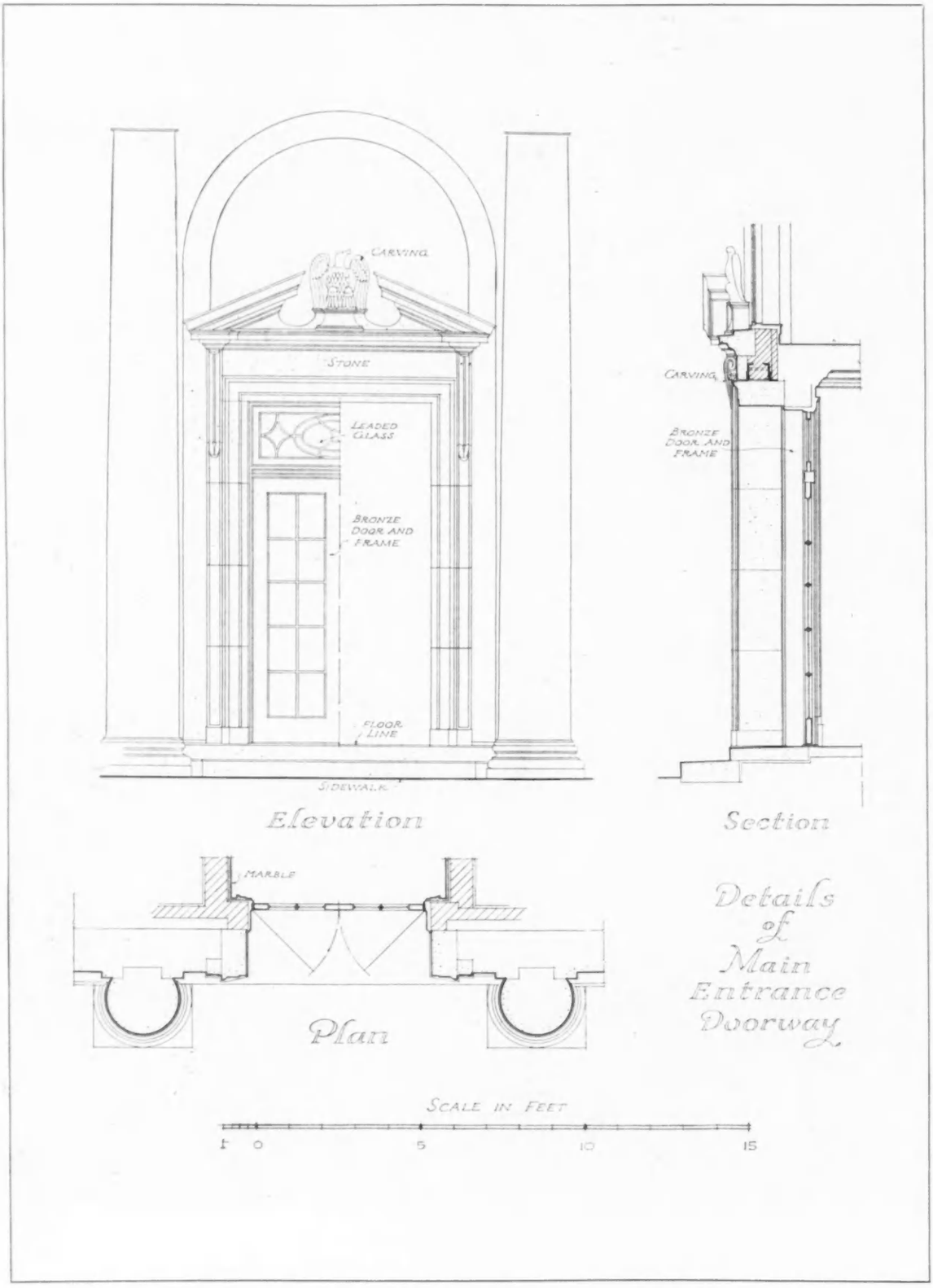

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DOOR INTO ENTRANCE VESTIBULE

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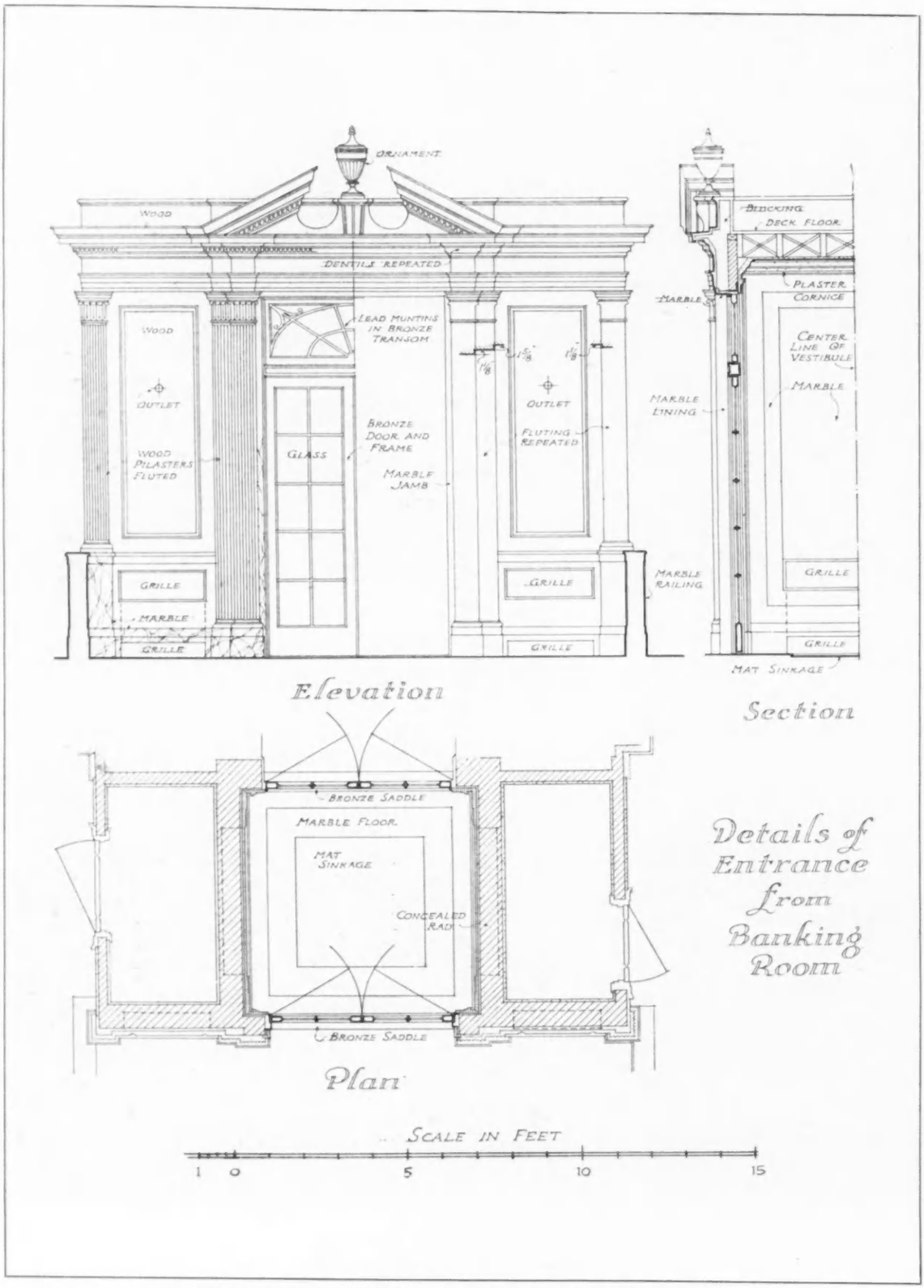

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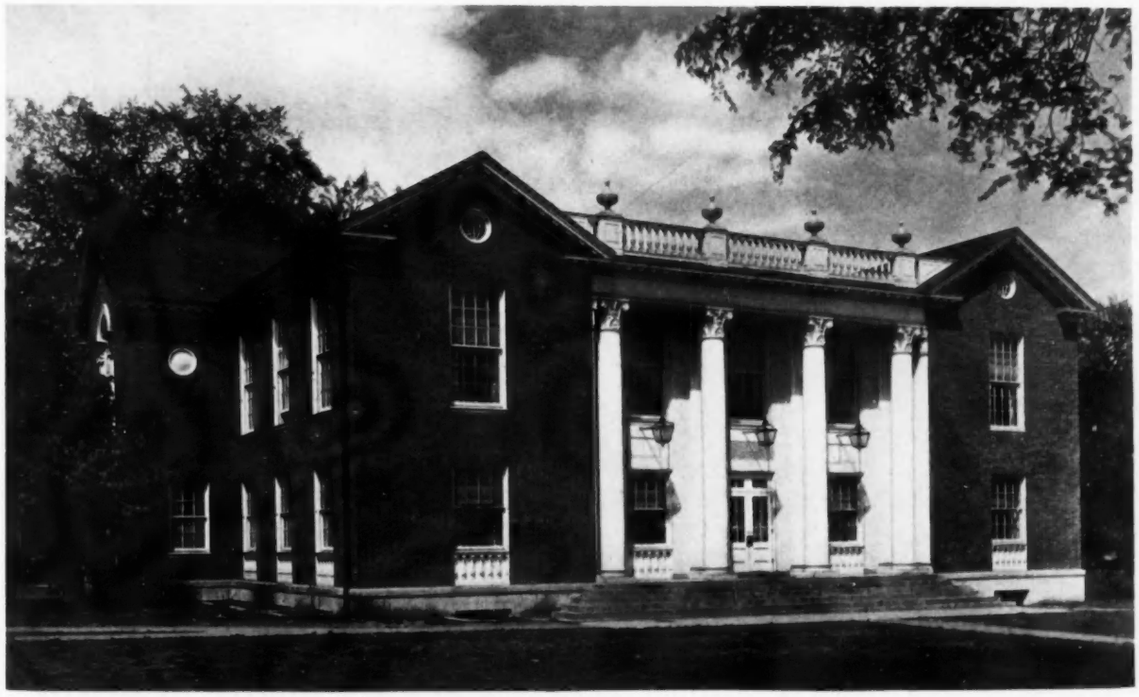

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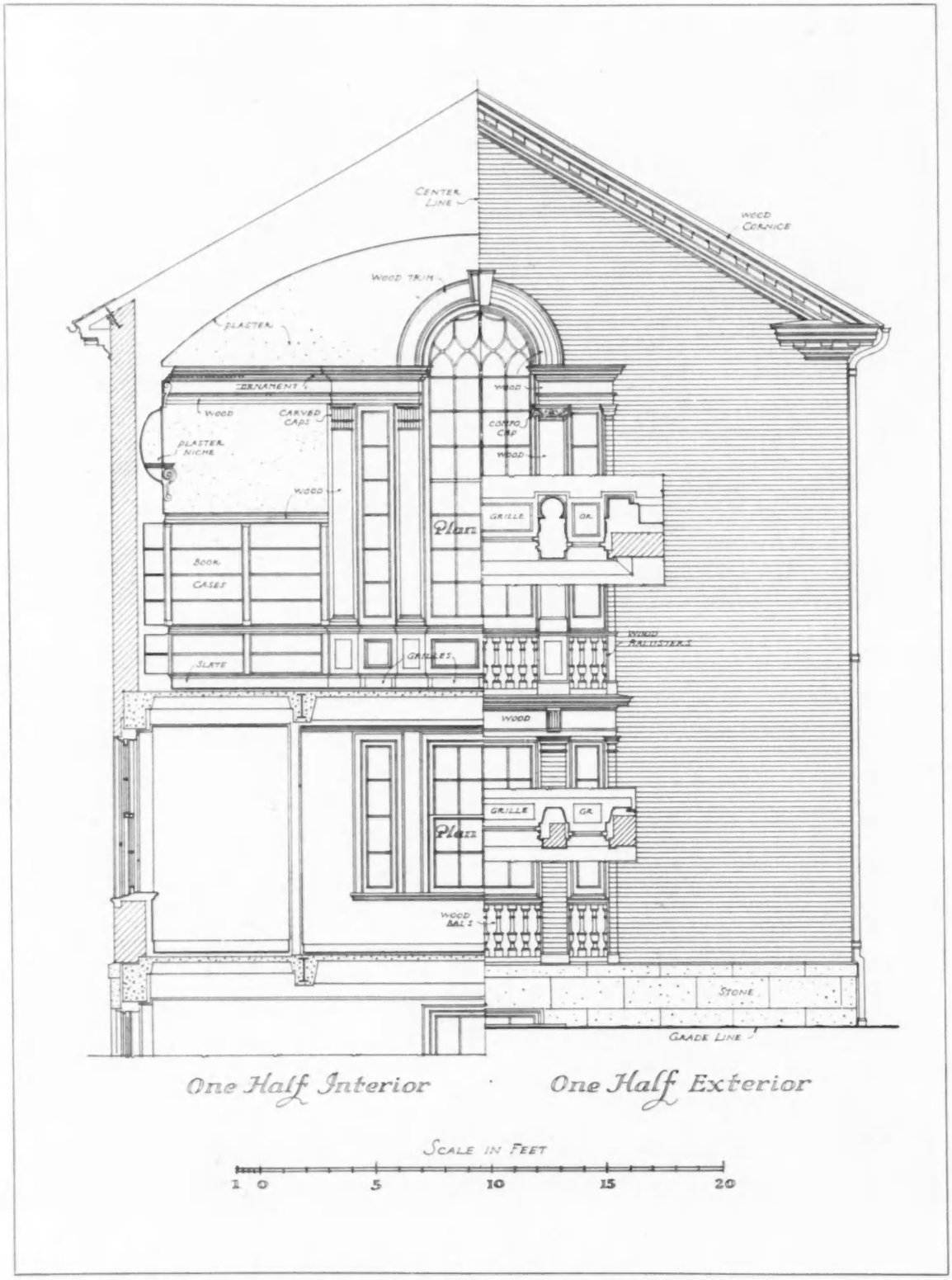

SCALE ELEVATION AND SECTION ENDS OF MAIN BUILDING

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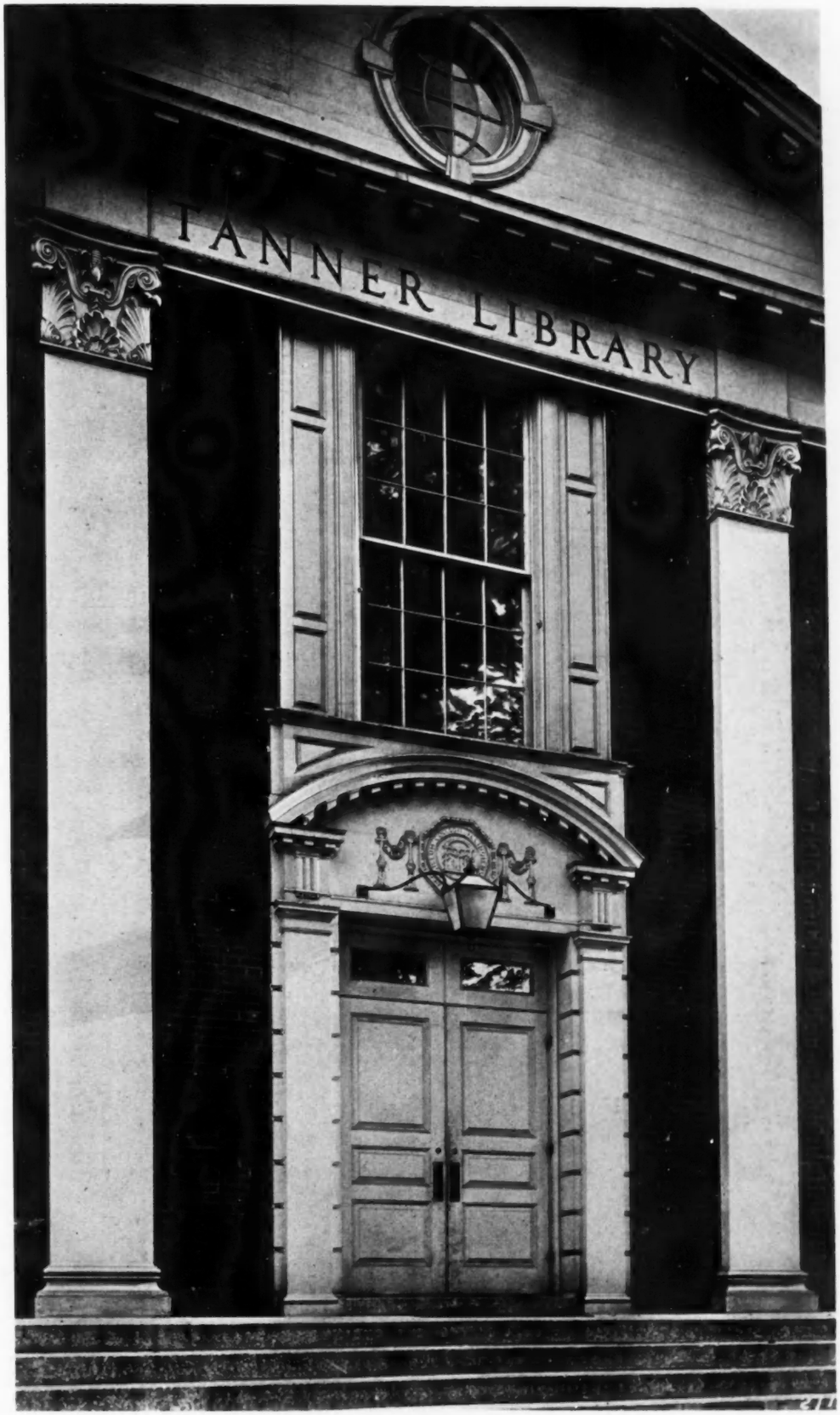

NORTH ENTRANCE

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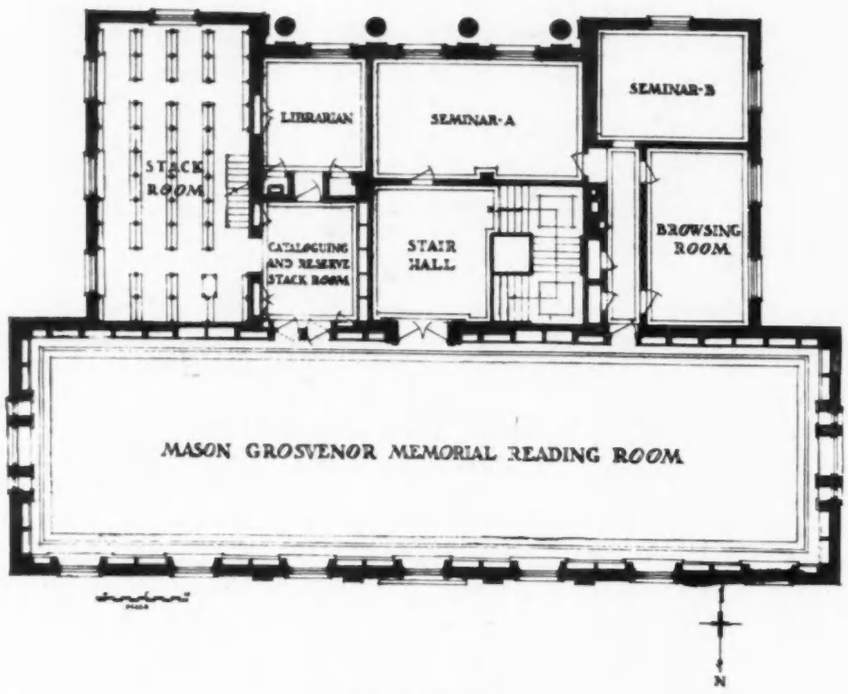
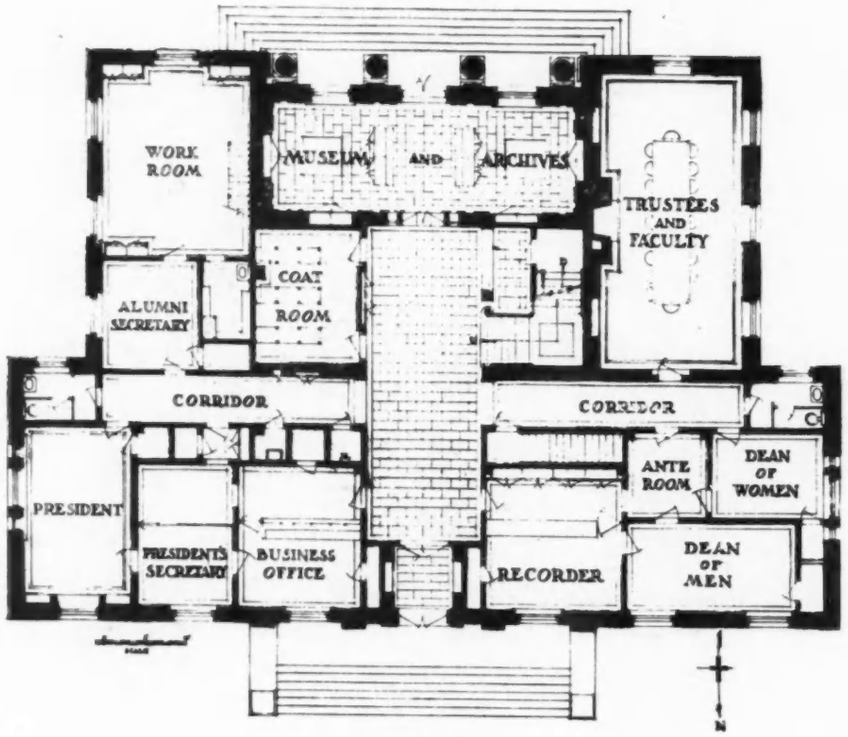


SECOND FLOOR



FIRST FLOOR

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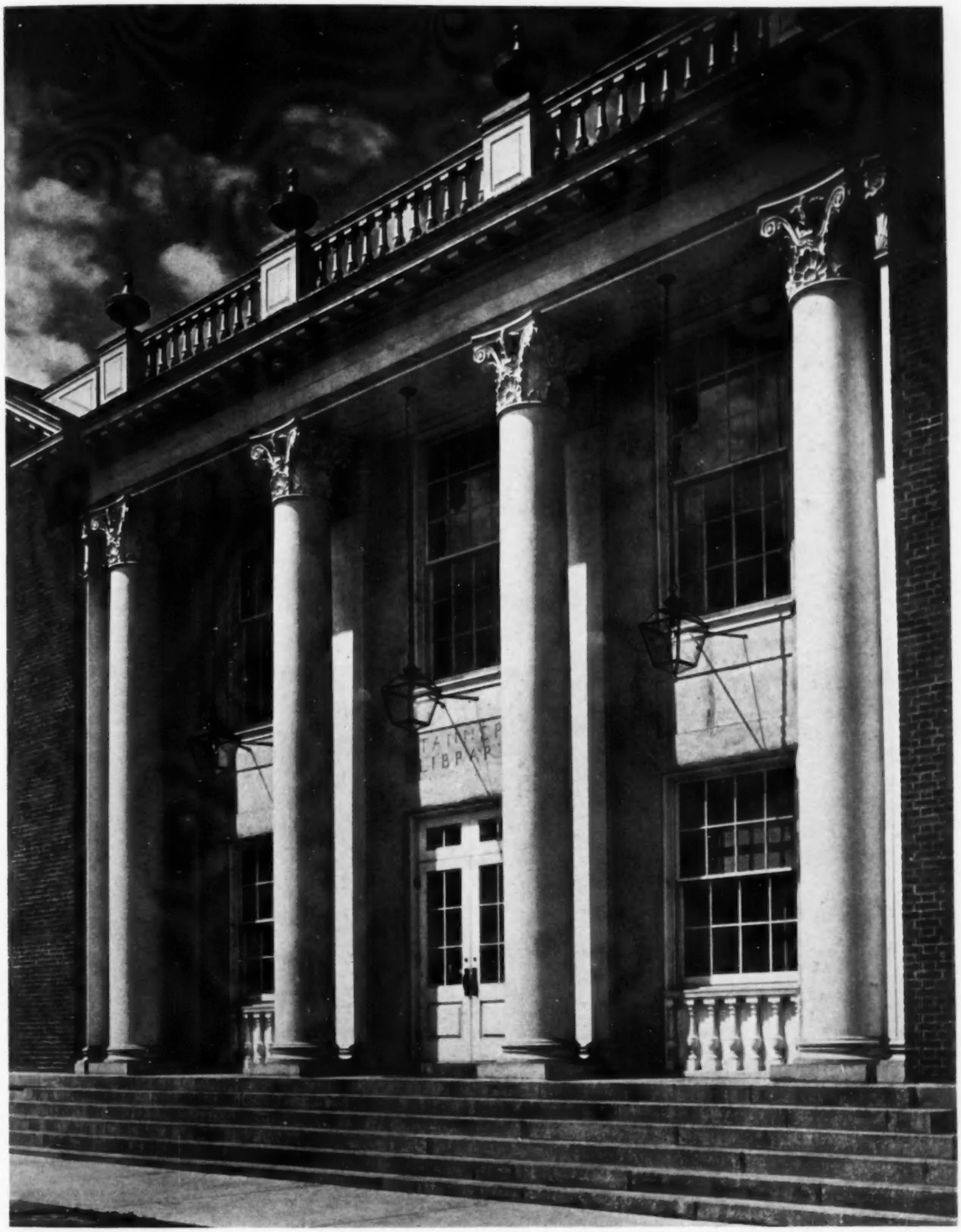

ENTRANCE—SOUTH ELEVATION

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READING ROOM

HALL

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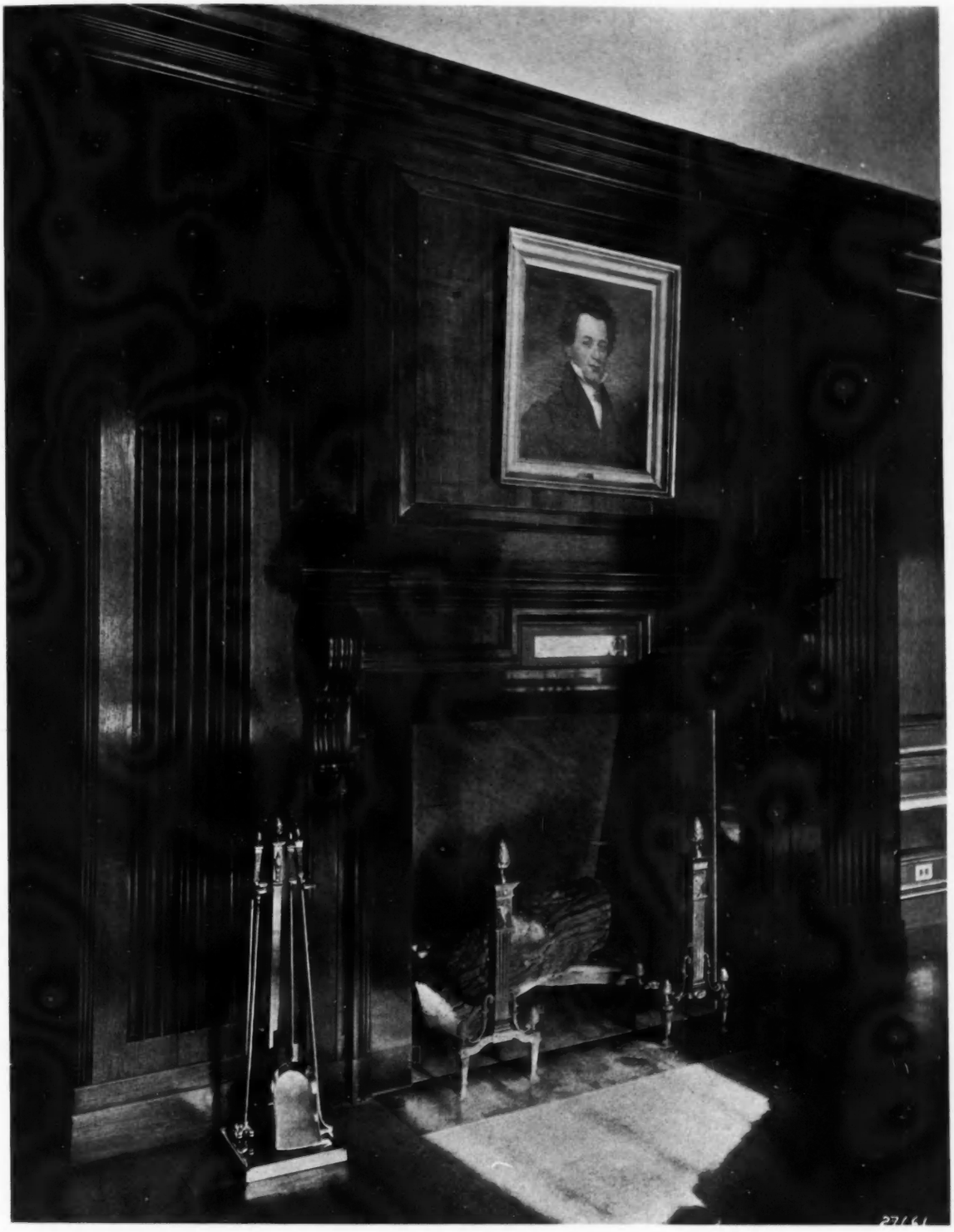

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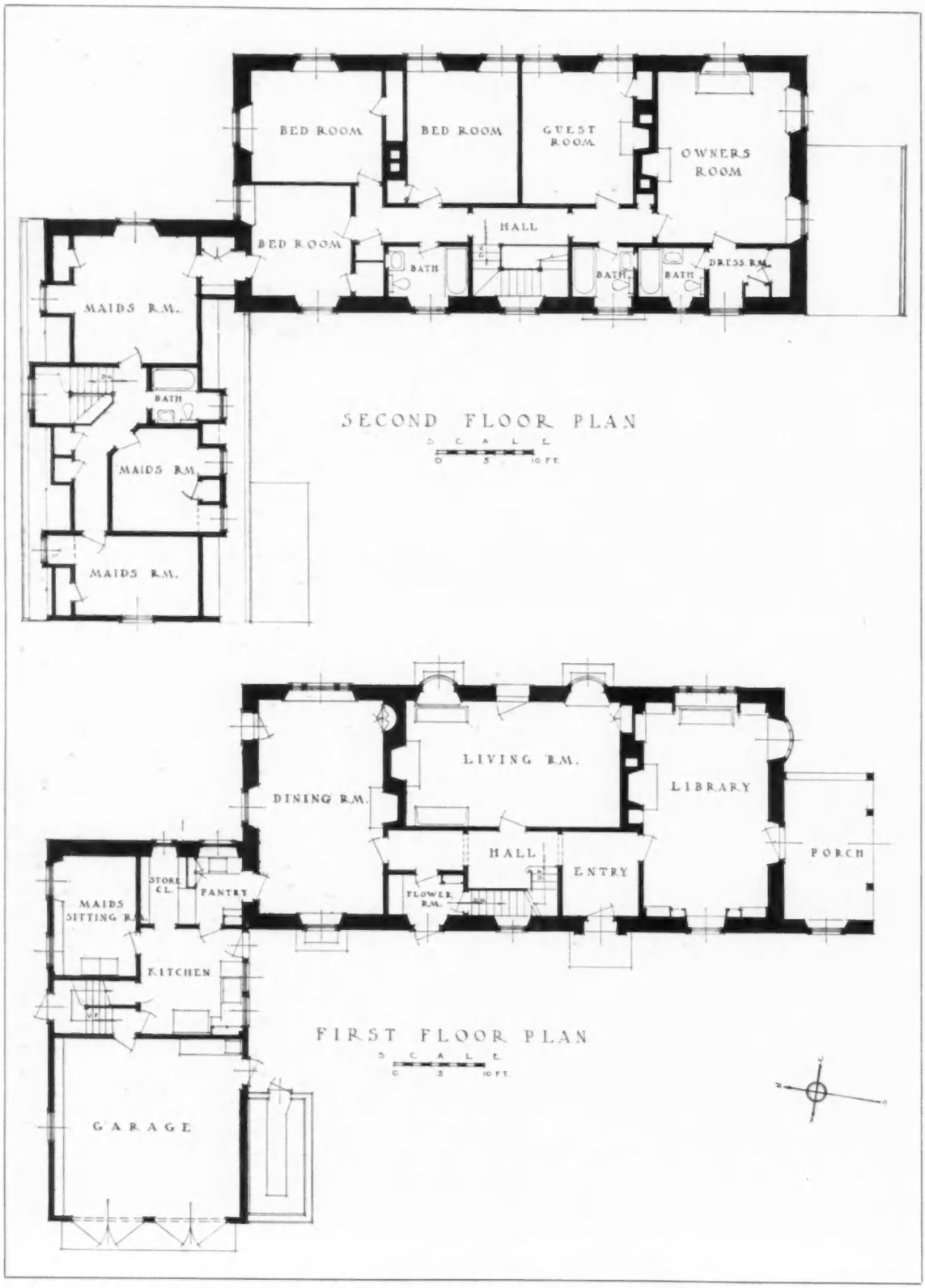

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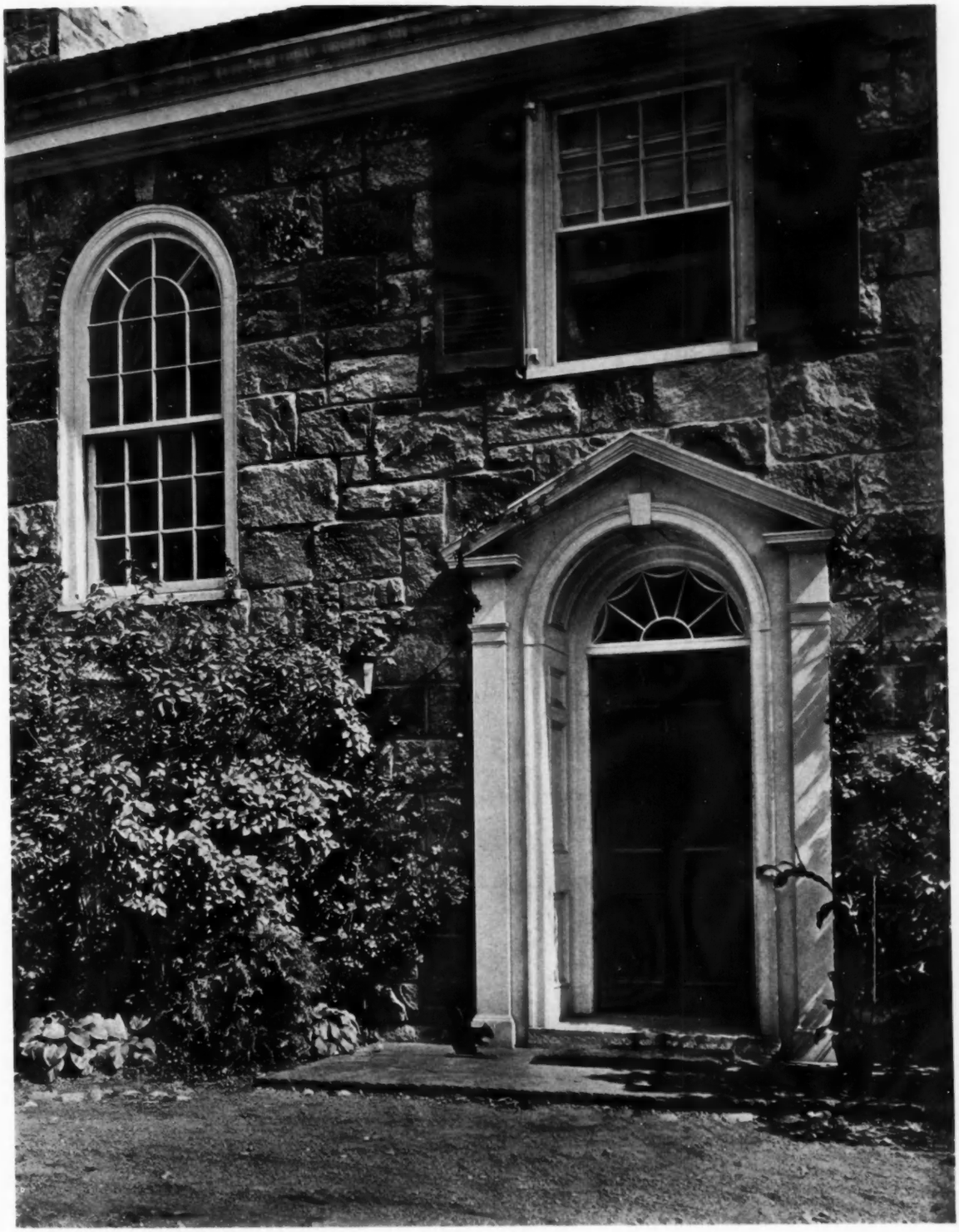

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MAIN ENTRANCE

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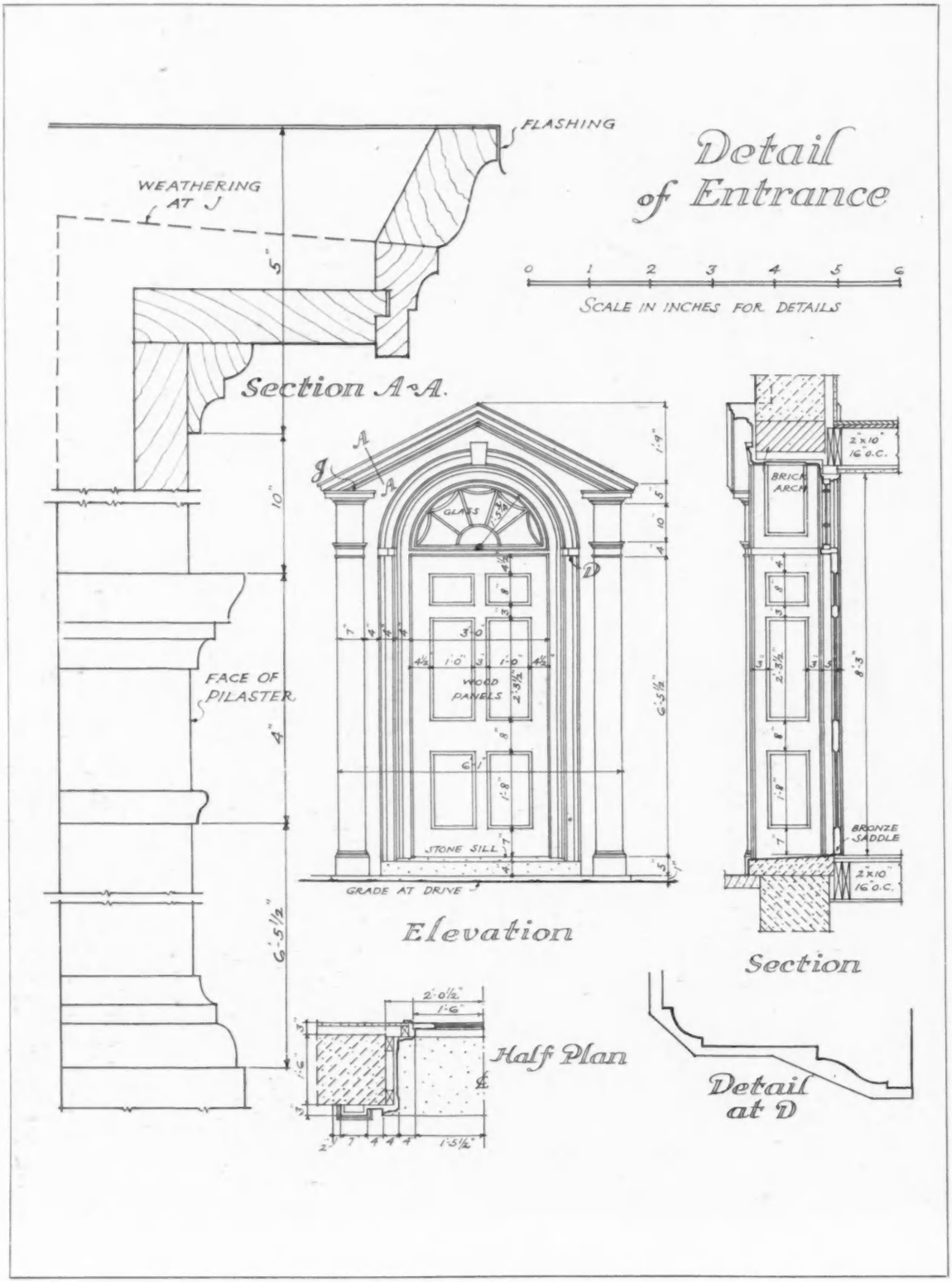

SCALE DRAWING, ENTRANCE DOOR AND STAIR WINDOW

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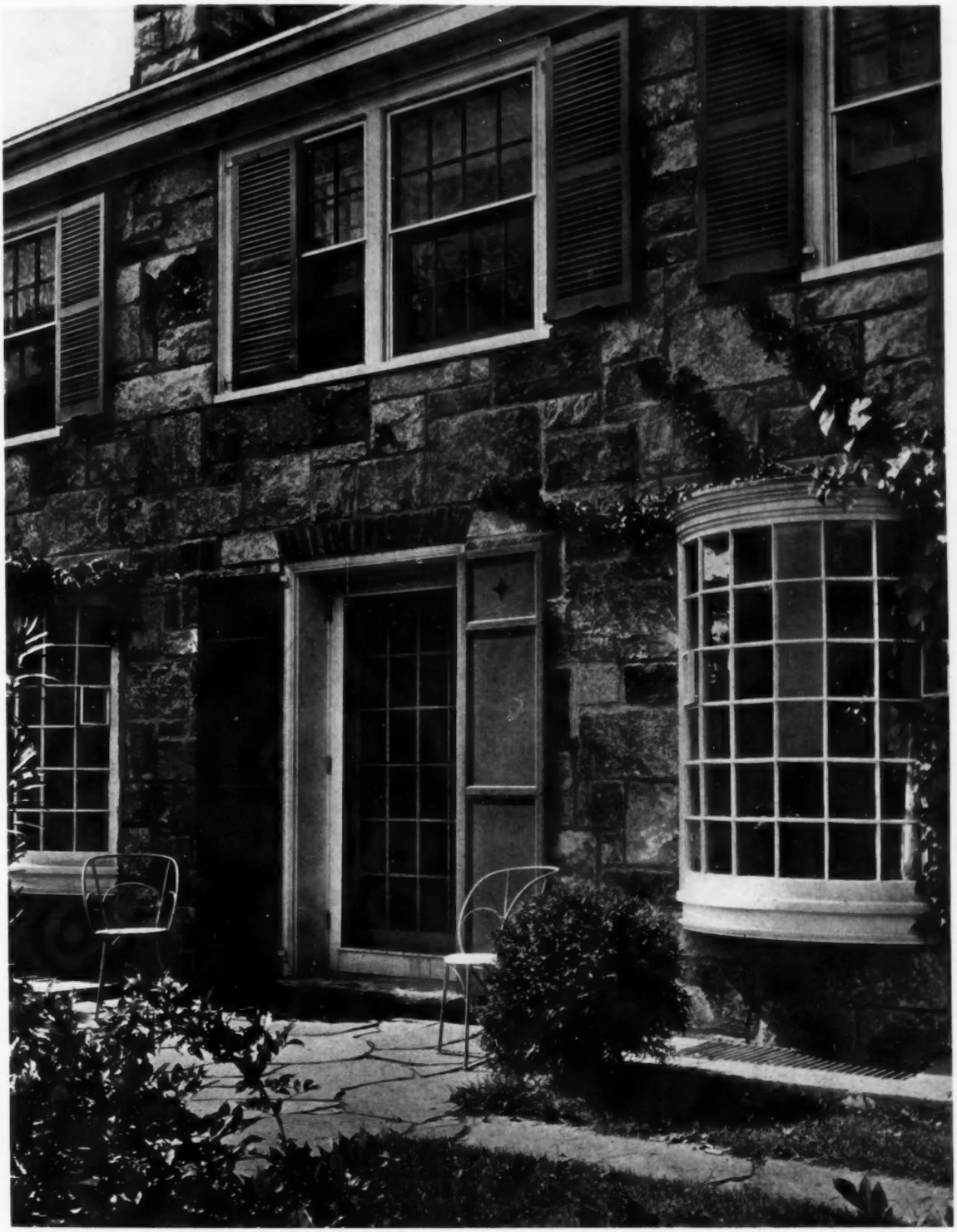

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GARDEN ENTRANCE

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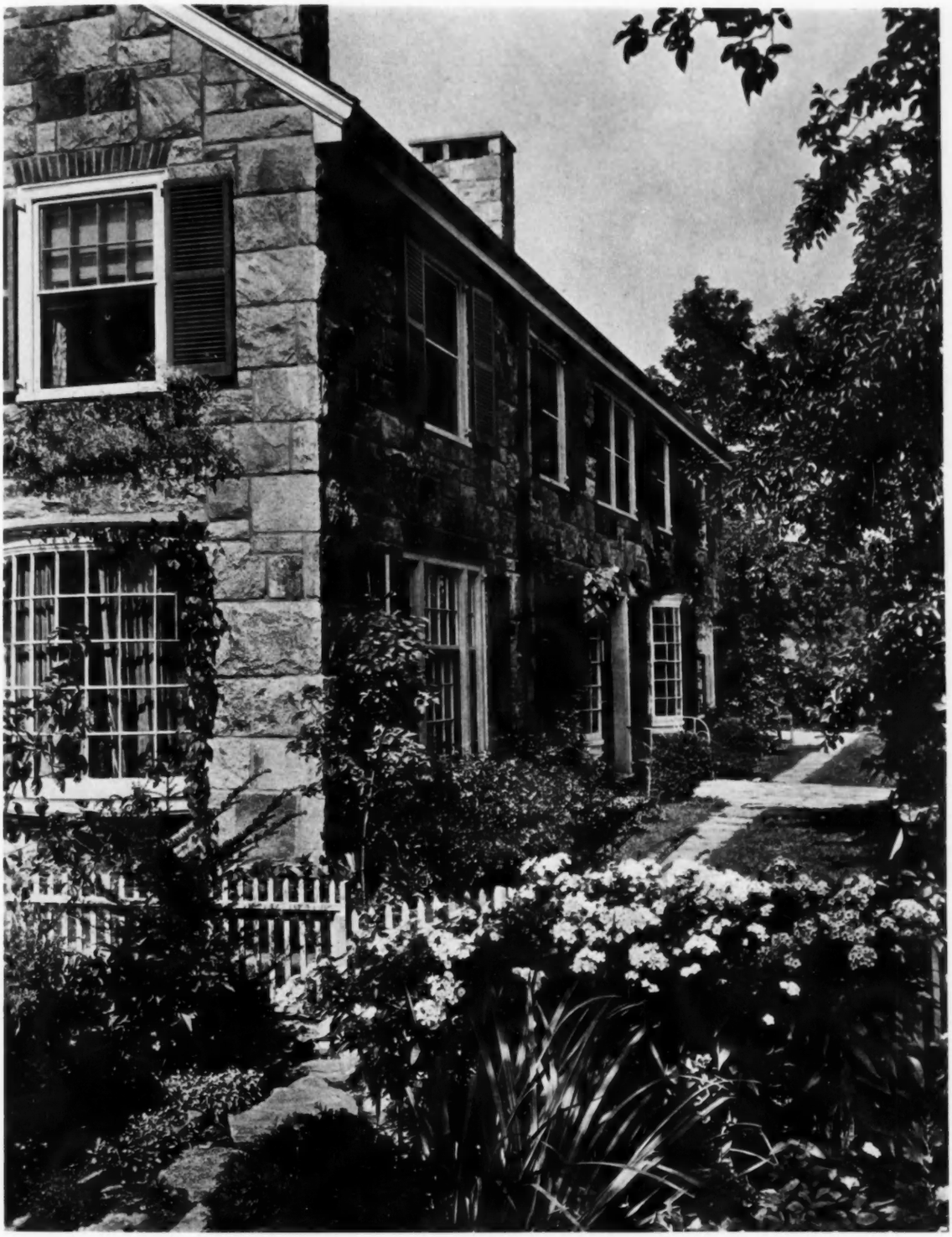

GARDEN FRONT

HOUSE OF MRS. M. W. WELD, STANWICH, CONN.
RICHARD HENRY DANA, JR., ARCHITECT

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ENTRANCE HALL

HOUSE OF MRS. M. W. WELD, STANWICH, CONN.
RICHARD HENRY DANA, JR., ARCHITECT

STAIR HALL

HOUSE OF MRS. M. W. WELD, STANWICH, CONN.
RICHARD HENRY DANA, JR., ARCHITECT

LIVING ROOM

HOUSE OF MRS. M. W. WELD, STANWICH, CONN.
RICHARD HENRY DANA, JR., ARCHITECT

HOW MUCH SHOULD AN ARCHITECT KNOW?

BY

KENNETH M. MURCHISON, F.A.I.A.

THE natural answer to that question is, Everything! But after all, aren't we but human? We try to learn; we keep our eyes open when we are *en voyage;* we never say, "I don't know!" to a question—or at least we never *should* be guilty of saying "I don't know!"

Architecture is a jealous mistress. It is the art of all arts. It is exigeante. It is as exact an art as one could wish for, and we cannot bluff it all the time. So to our learning.

WHEN WE STARTED

As a student, we commence by the study of the orders. We learn to draw a bulbous Doric column with its now familiar capital and entablature; next we go, in gayer mood, to the curlicue Ionic, where we wish we could simultaneously draw the right and left volutes with our right and left hands! Then to the flowering Corinthian—and we spend months trying to persuade the darn thing to look natural and striving to make the flutes look flutey.

Well, then, we spend a couple of years, if we're a clumsy draftsman, in learning all about the orders. And then we find that in the present modernistic trend the orders are in dour disfavor! But the study of the orders is a part—the foundation, in fact—of our study, something we must be familiar with. So we must needs learn those orders by heart. It may come in handy on a competition for a State Capitol or a Federal Reserve Bank, but we don't use them any more in ordinary common-or-garden practice, anyhow, not since the Telephone and Telegraph Building on lower Broadway was finished. Here the architect was so impermeated with the classic that he made his entire exterior of superimposed columns, all set back in the exact proportions of the Coliseum in Rome.

That was all right for ancient Rome, but how about the rentable area on the top floors of this pseudo-Classic, pseudo-Commercial structure in the business end of a business city?

ALLONS Y!

Now that we have settled the point of an architect knowing his orders, what next? Why, men, there is a veritable avalanche of nexts! Proportion, color, adaptability, style, knowledge of plan, circulation, choice of materials, manner of presentation; those and hundreds of other things.

All *that* is brought forth in school, too, with as yet no thought of the practical things to come later in life. The cost—above all other questions, the cost! And that is where the architect, however well-meaning he may be, falls down with a distinct thud almost every time.

Even with your best boy-friend contractor to give you all the cubic foot cost data at his command, it seems that the evil genii of the building trades, Old Man Extra and Old General Changes, always come in at the end and give your estimate a wallop in the ear that it never forgets—nor does the client forget it either!

AREN'T THEY ALL?

Clients—and I *like* clients—have a mean and nagging way of never forgetting how much more their buildings cost than their architects told them would be the case. They take gleeful delight in bringing up the subject at a party where everybody is having a good time. They ruin your digestion in the midst of a hearty dinner by slyly referring to it.

And the residential clients are the worst. Some of us are over the Private House Era of our career. It is something like the Polished Walnut Period of our memories. But when we were young and trying to learn (on our clients), we were designing, for the most part, private houses, mainly of the suburban or country variety.

And did we ever do anything right in them? Oh, no. And if we did, it was the clients' ideas that were the tasty ones, not ours.

As to what an architect knows, when he is approached by one who is contemplating building a country house, it is nothing to what he will know when the house is completed and the family has moved in! In the first place and at the beginning, he must know all about trees and flowers, soil and subsoil, artesian wells and sewage disposal, cables underground and wires overhead. He should also be able to answer immediately the question of whether it is cheaper to build the foundation walls of concrete or rubble stone (rubble rhymes with trouble, and there's many a leak in all of them).

THROUGH WITH THE DIRT

All that before we really get to the house itself. When we arrive at that point, the question of style comes in. The perfectly appointed architect should be able to whip out his 3B pencil and sketch a lovely little French farm house; or with a couple of rubs of a dirty thumb transform it into an Italian Villa made in Tuscany, or a Spanish one-and-a-half story Patio type of homestead.

Well, that's easy, of course. We were raised on that kind of a thing. We can all draw. If we couldn't draw, we'd be an engineer or an interior decorator or work in Macy's basement. Or perhaps solicit funds for a hospital.

We also know the rudiments of planning, the advantage of cross-drafts, the desirability of placing the accordion-playing help as far away from the guests as possible; also the advantage of putting the guest rooms in the third story smack up against a non-ventilated roof, so that said guests, being 90 per cent relatives, won't stay more than two or three days.

WE KNOW MORE ABOUT ORGAN PIPES

But when the eager and interested client asks you how much more a hot-water heating system will cost than a one-pipe steam outfit, and how much larger will be the pipes, the young architect gives an imitation of a swimmer going down for the third time. Truth to say there are not many of us who know much about the mechanical trades, or steel construc-

tion or heavy foundation work, or the chemical composition of waterproof paint. We all *say* we do and we *should* say it, but out we run to the Engineer in the office and whang that question at *him* for a speedy answer.

I am perfectly free to admit that any concrete slab I designed would immediately fall down out of sheer joy. I am also certain that if I laid out a heating system the result would be as it is in the best South American layouts—no result at all! Down there, if the pipes so much as sweat, the contractor gets his certificate. I came to the conclusion, early one morning in Buenos Aires, that the heating system of the entire city was run by alcohol!

Then when it comes to stucco work! Aha! Every stucco expert has different ideas, depending upon what cement company he is working for. And then when you follow, or tell the other fellow to follow, his instructions, along comes Old Dame Nature and gives it a couple of K.O.'s with a winter snowstorm or two, and zowie! our stucco house is alive with hair cracks and disfigured with hunks dropping off around the windows and doors.

WE KNOW WHO EVE WAS, TOO

The architect is supposed to know his Periods, as well as the rest of his P's and Q's. He ought to know who the brothers Adam were; he should recognize a Grinling Gibbon carving the moment he sees it; he should be able to point out the difference between a Bokhara and a Kurdistan rug, and he should be conversant with the size of a bath towel folded up. He sometimes forgets that a gentleman's coat on a hanger is 22 inches wide, and he doesn't always correctly figure the depth of the cook when she is standing between the range and the preparation table, which should be a part of every kitchen. He should know better than to make the guests go through a bedroom whilst they are seeking that Nirvana of Desire, the bathroom, and if said guest, when she enters the front door, knows she is going to get Brussels sprouts for dinner, why, the whole thing is a failure, that's all.

SOOTHING THE SAVAGE BREAST

Although it is rarely a part of an architectural curriculum, the art of playing the piano is a useful one to the young architect, and, surprising to say, it is quite a common characteristic.

A working knowledge of Chopin or George Gershwin often covers up one of life's embarrassing moments, while a ready answer to the question, "Are you familiar with red lead?" is "No, but I can play the *'Rhapsody in Blue!'*"

It's little things like that which go to make up a happier life for us architects. Pack up your troubles. Give them a ready answer, with parted lips and shining teeth. Any answer is better than no answer at all. It is just like love. And you can work *that* out for yourself.

GROWING UP

Now when you get out of the fledgling or adolescent class you get other problems. You abandon the clients of the weaker sex. You stand up, man to man, against the hard-bitten real estate operators, the iron-visaged bank directors or the complacent, never-to-be-fooled hotel operators.

These gentlemen waste no time on Period furniture; they don't inquire as to whether the hot-water system will work—it's got to work with those boys! What they're after is *Results.*

If they have their eye set on a piece of property and have to give an answer on it that same day, in they stroll to the architect's office, give him the size of the property and the cost thereof, and in two or three hours they expect from this architect a complete set-up of the whole enterprise; all costs, fees, carrying charges, rentable area in square feet, also what the janitor looks like, and other items. All that, including a typical floor plan, in a few hours.

And the operator rarely agrees with the architect as to the cubic foot cost. The operator always thinks it can be done for five or ten cents less than the architect's estimate. Hence another fight! So that's another phase of our art, Promoting.

RINGING WORDS

Still another thing that an architect should know is how to get up on his feet and talk. He ought to be able to appear before a Board of Directors who are considering several architects for their new building and persuade them that he is so much more qualified than are any of the others to suit the honorable Board that there's nothing to it, and they needn't waste their time with anyone else.

Still another thing—and it's a ridiculous sounding thing too—is that we should know enough to recognize a crook or a highbinder when we see one. Architects, like other professional men, are targets for all kinds of schemes.

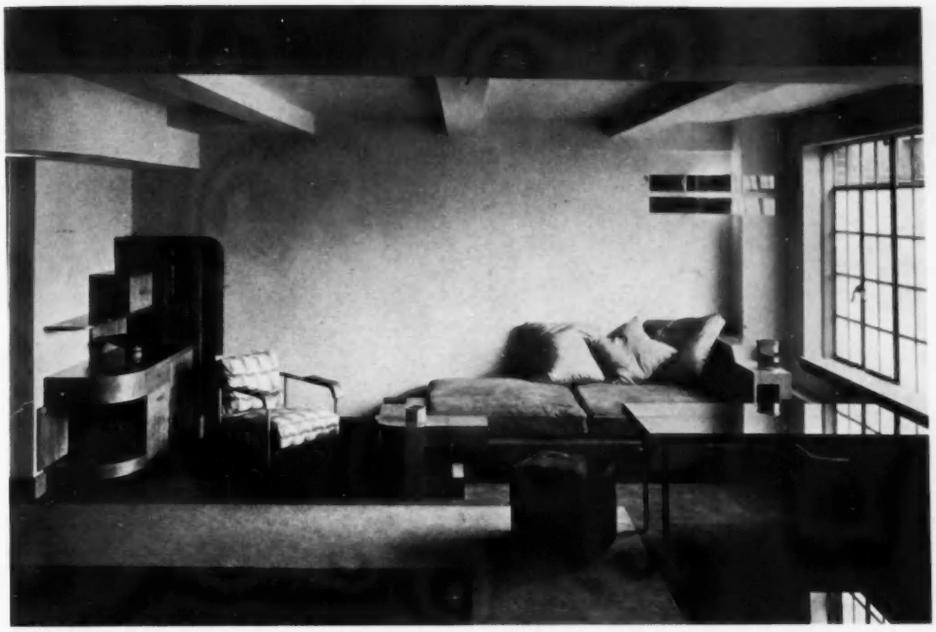
A man may come in, with all sorts of recommendations and good manners, with not too strong a handshake, and he will outline a proposition which seems to bear scrutiny. But the moment he wants you to put money in it, drop him like unto the old family wheat-cake. They have to have in their schemes what is known as a lead-off man. And they generally start with the architect or the builder. And then the scheme generally is a dud.

HOW LONG IS A PIECE OF STRING?

Other things an architect is supposed to know include: The selection of a proper kind of wife; a smattering of the Latin tongues; a working knowledge of golf; is or are acoustics?—English chintzes; the correct size of a stall so that Papa's pet horse will not cast himself; how to soundproof a singing school; what size circle can a Ford turn in; what is chiarascuro? ditto *cinquecento?* What was Michelangelo best at? Who designed the Woolworth Building, and who makes Whitney Warren's shirts?

But if you live long enough; that is, if you live so long that nobody cares whether you're living or not—then, and only then, will you know enough to be classed as a real architect. If we know enough to get along with, we're accounted lucky, and a slight lack of intimate knowledge of some of those outlying things mentioned here should not deter us in our ambition to become real architects.

We may not be educated to the fine degree of learning enjoyed by the professorial class, but architects cannot be entirely dumb—or they couldn't be architects. And remember, no matter what they ask you, never forget yourself and say, "I don't know!"



Ralph Steiner

THE STOKOWSKI APARTMENT

HOWE & LESCAZE, ARCHITECTS

BY

ADOLPH GLASSGOLD

THE problems of built-in furniture are manifold, but paramount among these is the question of how far the designer may be permitted to go in impressing his own individuality upon a design that permits of very little or no variation. Where the design is intended for a public or semi-public place, the designer's bias, or prejudice, or inclination if you will, is as satisfactory a solution for the variety of tastes as any. But when it comes to private apartments, the individuality of the owner is so significant a consideration that friendships are known to have been severed by a tactless remark made by some well-intentioned visitor regarding the color of the draperies. True, not everybody is so endowed with taste or a pretension to it that we need be constantly on guard lest our unpremeditated remarks offend our hosts. For matters of social ease this is most fortunate, although its effect upon the state of American interior decoration is by no means salutary. Yet little aware as most people may be of the technique of interior decoration, of the effect of color, form, mass and arrangement in a room, it is the rare person who leaves entirely to chance the final effect of his home. The least of them likes to believe that some revealing note, the touch of a flower, the hanging of a picture, the choice of a rug, speaks of a unique personality. Artistically disastrous as this freedom of personal expression often is, nevertheless, the truth remains that no two individuals will have absolutely the same kind of a room, given even the same materials.

Is it then too much to expect a rigorous and unchangeable design to satisfy a client embarking upon the adventurous pursuit of modern decoration? The answer is not so simple. Were the answer in the positive it would imply that no artistic creation meant for personal use would ever be appreciated or enjoyed, since the abyss between tastes created by differences in personality would be forever unbridgeable. The contrary, is more likely the case, and is partly accounted for by the fact that the many who do not create, secure vicarious expression by appreciating the works of those who do. This is true even of persons with distinct preferences; pronouncedly so with those who appreciate what they vaguely term as "pretty" or "nice."

The artist in the modern style whose tendencies are in the direction of design that shall be an invariable unit, therefore, has the vexatious rela-

Dressing-table Group. Apartment of Mrs. Leopold Stokowski, New York. Howe & Lescaze, Architects

tionship with his client somewhat alleviated by the fact that his own particular style may on occasion fortuitously coincide in every detail with the inclinations of those for whom he designs. Even then his lot is harder than his colleagues', who though they design ensembles uniquely their own, nevertheless, permit a certain latitude in the disposition of individual pieces and thus allow the client the satisfying delusion of active participation. The latitude extends in some instances to the choice of pictures, frames, draperies, cushions, etc., with woeful consequences.

Of course, I exaggerate the difficulties of the purist, for even he is called in for frequent conference by his patron during the creation of the design and is distressed more than once by the innumerable changes to be made during and after execution. If a purist is to lead a comparatively normal life unworried by the relentless, fretful criticisms of his clients, his creative gift must indeed be unusual.

Perhaps, I had better explain what I mean by a purist in interior design. With more truth than levity, it means one who executes an interior of so permanent a nature that the removal of the smallest element, or the least change of color is about as disastrous to the general effect as the mention of Water to a Wet. I mean, furthermore, that the bed or the table will remain forever in the spot indicated by the designer and will not go perambulating about the room propelled by the whimsies of a fickle mistress. Add to that the elimination of all meaningless ornaments and the insistence upon practical translation of design, and you see my picture of a purist. That William Lescaze, of the firm of Howe & Lescaze, all but succeeded in retaining his original conception is a tribute either to his extremely right sense of design, or the unquestioning acquiescense of the Stokowskis, depending upon how one prefers to look upon it. In all fairness to both, it must be recorded that the original color harmonies of blues in walls and ceilings of the large room have now been replaced by a uniform green which I have never before seen in Lescaze's palette, and which I seriously doubt came from his paint box.

To know how successfully Lescaze has captured the spirit of the Stokowski household and imprisoned it within wood, chromium plate and glass would demand a discussion of personalities; a thing I am neither equipped nor inclined to do. Looked at objectively (a critic is generally presumed to) as a design unrelated to the personalities of the owners and forgetting for the moment the easily recognizable touch of Lescaze, the two rooms are an additional tribute to the essential sanity and beauty of modern design. They are good illustrations, especially of what fine things can be done with built-in furniture.

Window Treatment. Apartment of Mrs. Leopold Stokowski, New York. Howe & Lescaze, Architects

Ralph Steiner

Lescaze's work in this apartment covered a small foyer, a bedroom and a large studio. By their clarity of arrangement, broad masses and unadorned surfaces, they again make one thankful that designers have dared to disdain puffs and bustles.

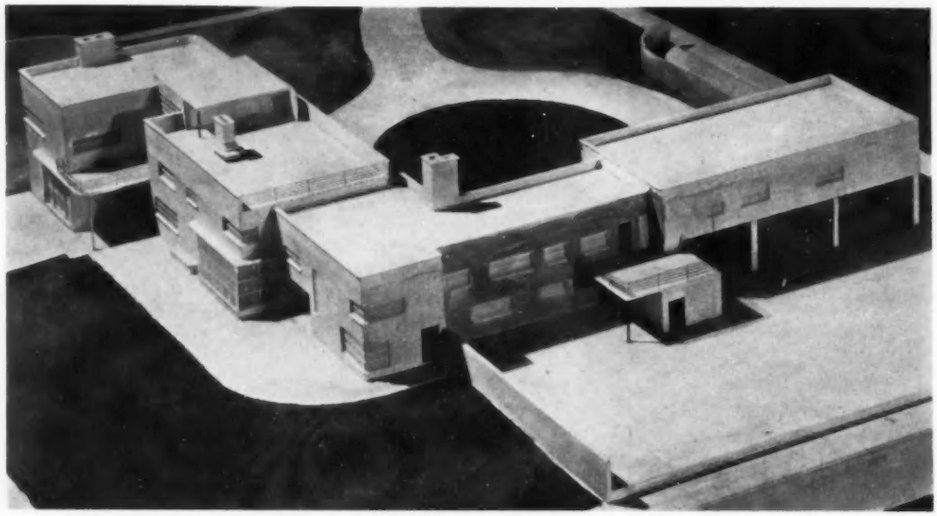
The bedroom contains a bed, settee, a chair and a dressing table group, above which is a decorative lighting fixture in chromium-plated brass. Dandelion yellow and gray form the color scheme, the gray being contributed by carpet, upholstery and the harewood furniture. The room is small but uncluttered, yet containing all the necessities for comfort. All the furniture is, of course, built-in, and considering that the room, small as it is, has four doors, is disposed with a finality that leaves little need or possibility for alternative lay-out. The existing beams are exposed and are treated as part of the decorative effect, as in the studio.

This room is a music, sitting, bedroom and library combination in which two large steel casement windows maintain the perpendicular effect of the beams and the design in the rug. Between the windows stands a sofa. At one end of the room is placed the convertible studio couch and a piece of furniture for whose manifold uses no name has as yet been invented. At the other end are a secretary-bookcase and piano. An interesting feature is a contrivance against one of the windows whereby a portable leaf may be hinged on to the wall to form an additional table, or removed and stored away against the wall when not in use.

As I mentioned before, the walls were originally done in blue and were probably more suited to the harewood furniture, blue upholstery, blue glass table-tops and gray rug than the present green. But there enters again the ever-urgent consideration of the inhabitant and the conflict never to be disregarded in evaluating a finished commission. In the face of Lescaze's excellent work one is tempted to forget the problem and accept the interior on its own terms; on the basis of design pure and simple.

It is interesting to note how Lescaze converts seemingly recalcitrant features into plastic elements in his design. An illustration of this is the overhead beam stopping abruptly at the doorway between foyer and studio. This ungainly projection, Lescaze has prolonged in a graceful curve from one room into the other. In the soffit of this false beam he has inserted a lighting fixture. Thus in one move he has nicely solved two problems: established the continuity of the two rooms and secured the necessary illumination for that portion of the interior.

If one word were sought to characterize these interiors, then "exhilarating" is what I should suggest.



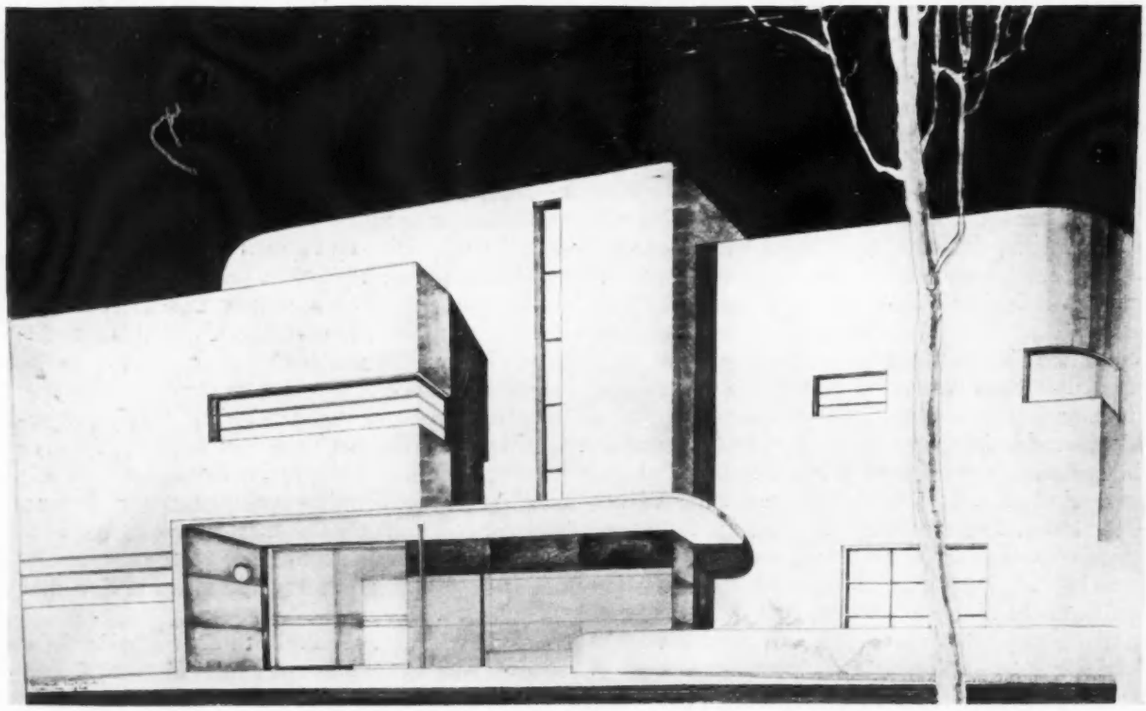
HOUSE OF WILLIAM STIX WASSERMAN, ESQ., WHITEMARSH, PA.

HOWE & LESCAZE, ARCHITECTS

BY

ADOLPH GLASSGOLD

WHETHER for ill or good, contemporary American architecture is evolving a building type adapted to the exigencies of urban life, which to many is satisfying not only for its mechanical ingenuity and functional rationalism, but also for its æsthetic values. But America has not yet developed a domestic architecture which is as gratifying from all the points of view claimed for the skyscraper by its proponents. Particularly has it not achieved the perfect country residence. The Colonial, the American Georgian, the Americo-Spanish, the granite



boulders and the rambling, gabled framed houses were charming enough in their day, but their day has been outlived. We outlived imitation.

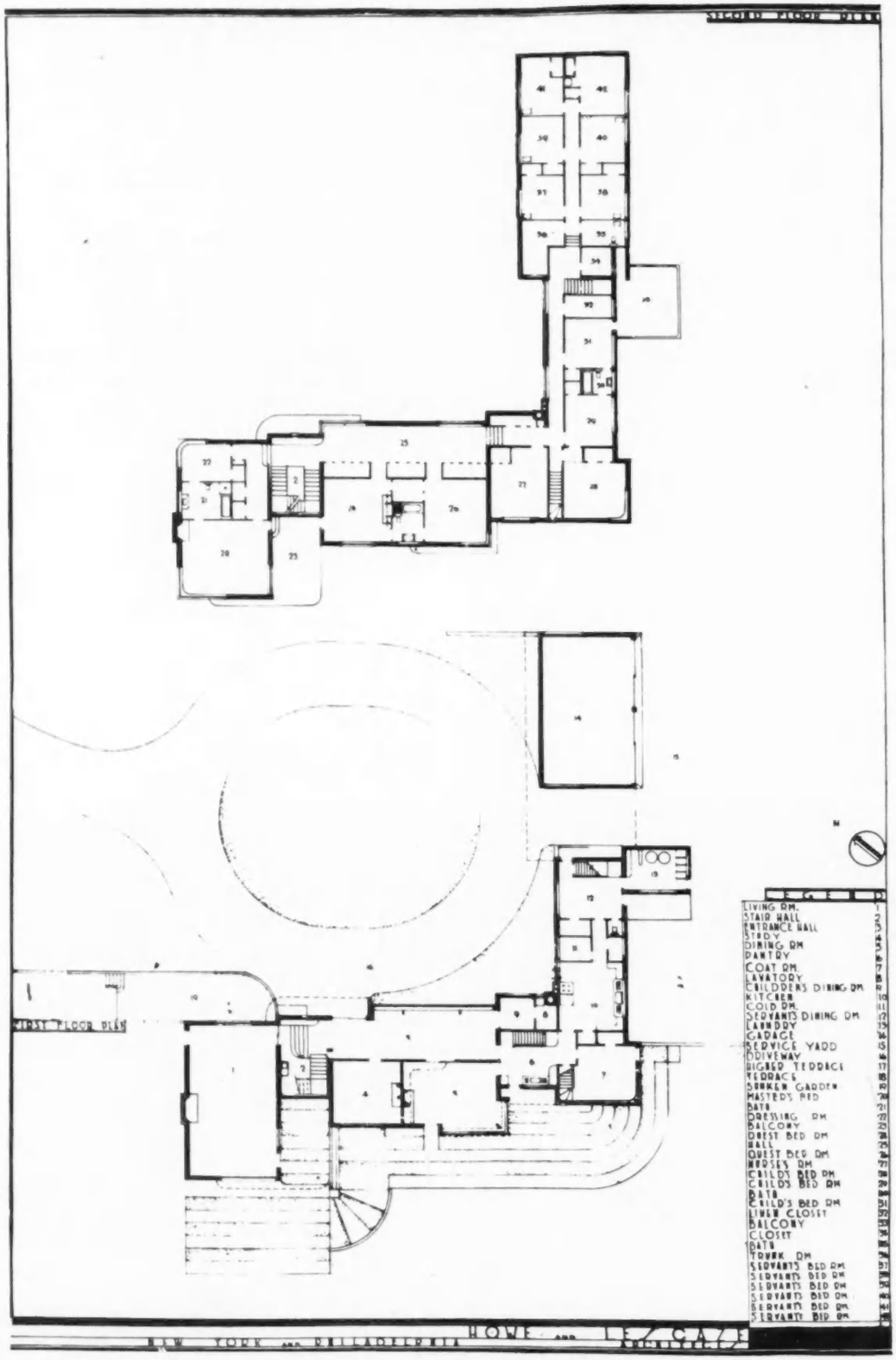
Frank Lloyd Wright, so it is slowly being admitted by all, has in his effort to free American architecture from the stultifying traditions of "the orders" and the periods, done much toward creating a purely indigenous domestic building. His type, though unquestionably suited to the locality, is nevertheless exclusively appropriate to the flat lands of the West. It may well be that the variety of the American landscape, with its distinct sectional contrasts, makes a uniform, or generally similar style, impossible. Whatever may be the eventual form, it nevertheless remains true that the American rural home is one of our major architectural problems.

In the nature of a solution to this problem is the project for the residence of William Stix Wasserman, Esq.; designed by Howe & Lescaze. It is not meant to be understood that this project is the final word in American country homes nor that its style predicts the eventual form of domestic architecture in the middle Atlantic states. It is frankly in the spirit of French *purisme;* of Mallet-Stevens, Lurcat and Le Corbusier, who design with a background totally different from the American scene. Its severity of form makes it a little too austere and harsh for our wooded and rolling landscape. Yet it does possess significant and valuable features that are bound to be incorporated in the future country residence.

Principally, it is its highly serviceable plan that commends it. The rooms are so strategically laid out that the principal rooms obtain views to the southeast and southwest which are the two most attractive prospects. This is accomplished by a series of set-backs in plan and by providing the rooms with corner windows, whose angles point due south. Each steel sash is designed in form and operation for its particular purpose and location. The building is to be of pre-cast concrete, using the sand and gravel found on the premises. Particularly valuable from a practical and artistic point of view is the construction of the roof. This, in a series of terraces, will provide solariums, sleeping porches, etc., and by its varying levels contribute to the interest of the elevation. The fenestration is arranged with an excellent sense of design, being disposed in such a manner that the exterior should have a distinct continuity as one circulates about it. The exposed balconies operate similarly to knit the abutting forms into an ordered unit.

The structure is organically conceived and for its ornamentation depends upon purely architectural and plastic means: solid forms, beautifully balanced wall areas secured through sensitive fenestration, carefully related and proportioned openings. In addition, the simplicity of the building, the logical disposition of the units and the refined proportions of both plan and elevations make this residence a worthy step in the evolution of the American home.

House of William Stix Wasserman, Esq., Whitemarsh, Pa.
Howe & Lescaze, Architects



House of William Stix Wasserman, Esq., Whitemarsh, Pa.
Howe & Lescaze, Architects

BOOK DEPARTMENT

AN INTRODUCTION TO THE HISTORY OF ARCHITECTURE

A REVIEW BY

CLIFFORD WAYNE SPENCER

THE history of mankind is closely bound up with the history of architecture. Every great civilization has developed its own distinctive types of building, and it is by studying these remnants of examples of these styles that we may learn something of the true nature of the people by whom and for whom they were built. The written chronicles of history may recount more or less accurately the important events that took place and even something of the social, economic and political developments of a given era or nation, but it is very seldom, if ever, that they record an unbiased conception of the everyday life and nature of the masses which formed the basis of all civilizations and states.

For an indication of the social, religious and political fabric of the nations of the past, and even of the present, the buildings in which the people lived, worshiped and carried on the affairs of state are the best historical documents. Thus we can learn from the sheer massiveness of Egyptian temples that they were built by a nation of slaves oppressed by their rulers and compelled by their superstitions to spend their lives in endless toil that they might erect by primitive means great palaces for the Pharaohs and temples to their gods. In like manner the observers of the future may learn from a study of English domestic architecture that the backbone of the British Empire consisted of peaceful, home-loving yeomen, content with their status in life and willing to live in their humble picturesque cottages and serve the considerable body of landed aristocracy and nobility. The rise and fall of the Roman Empire may be traced from the severe simplicity of the early republic to the lavish indulgence that brought about the downfall of the empire, by means of a study of the buildings of the various periods. So it is that the more carefully one investigates the character and structural features of architecture the greater becomes one's understanding of the forces underlying historical development.

Unfortunately, volumes which aim to cover the history of architecture in detail are likely to become so massive as to discourage anything like a careful perusal by even the professional reader. How many of us have resolutely determined to read carefully through the pages of Sir Banister Fletcher's "History of Architecture on the Comparative Method," only to be overcome in the early stages by a realization of the immensity of the task? In fact, if one should have the diligence to carefully study all the material in some such complete and authoritative work, there is danger that he might become lost in the maze of detail and lose sight of the general picture of architectural history. It is as an introduction and supplement to these more complete treatises that the little volume which is the subject of the present review will probably be found most useful. The architect who has long passed his student days and would like to refresh his memory as to some of the major features of architectural history, will find it a valuable short cut in doing so, as will those who wish to make a rapid review of the subject in preparation for an examination.

As is the case with many books on the subject, emphasis has been placed strongly on British architecture. In fact, it might almost be called an introduction to the history of English architecture. The earlier styles of architecture are well covered, however, and the author follows the usual procedure of tracing the stages of development in chronological order, starting with the Egyptian and following with a chapter on the architecture of Greece, Rome, the early Christian and Byzantine, Saracenic, early British and Saxon, Norman, French, Gothic and Renaissance. The rest of the volume treats of the various types of English architecture under the headings of Early English, Decorated, Perpendicular, English Houses, Parish Churches and Monasteries.

It can be seen that as a guide to the general history of architecture many important contemporary styles have been overlooked. The authors no doubt intended it as a guide to the study of English architecture, and as such it is very successful. As a matter of fact, the list of important buildings contained in the appendix might well serve as a guide as to what the architectural student should see while traveling in Great Britain. In presenting their material, the authors have based their selection on the sound fundamental principle that good architecture implies all builders' work that is nobly conceived and faithfully carried out. This at once shuts out a vast number of buildings which pretend to be what they are not, or which grudgingly supply our bare material needs but offer nothing to the mind and spirit. As defined by the authors, "nobly conceived" does not necessarily mean the grand and the magnificent, for modesty and simplicity stand high among noble qualities, and there is many a quiet little building that deserves to be included in the realm of architecture and many a pretentious pile which does not. Any building which does its proper work well and with grace and dignity may be said to be "nobly conceived."

Since architecture springs from good building, it follows that an understanding of architecture depends to a great extent on a knowledge of the simple forms of building and the proper use to which materials are put in all countries and at all periods. "The too-commonly

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accepted approach on the æsthetic side usually directs attention to the superficial ornamentation of a building, but fails to arouse any real interest in its finer qualities, and, indeed, only too often the decorative beauty of a noble style is ignored, while the student is allowed to concentrate upon a few of the more obvious details." It is not surprising, therefore, that we find in the pages of this work much space and many illustrations devoted to highly important structural and utilitarian features of building. The documents are well chosen and clearly presented, although they are not as numerous as in the case of some of the more complete architectural histories. The appendix gives, in addition to the list of names and locations of important examples of English architecture, a valuable and interesting "Glossary of Terms Used in Architecture."

AN INTRODUCTION TO THE HISTORY OF ARCHITECTURE. By H. Barrett Carpenter and Joseph Knight. 292 pp., 5 x 7½ ins. Price, $2.50. Longmans, Green & Co., 55 Fifth Avenue, New York.

METALS are attracting attention because their uses are becoming more numerous and unusual. Forward-looking architects are giving increasing attention and study to the characteristics of metals and their possible uses that are within the scope of architectural practice. We are all accustomed to the use of cast iron, wrought iron and steel and bronze in connection with buildings, and the use of metals in furniture manufacturing in Europe is bound to have its effect on furniture designing and production in America. Other applications of metal to building construction are being studied seriously, and the metal-clad building of real architectural merit is passing out of the visionary class into reality. Under these conditions it is but natural that architects are seeking knowledge pertaining to all metals that promise a fruitful field for exploration and adaptation to uses within their province. Among these metals is aluminum, the architectural use of which is still embryonic.

The work under discussion is divided into two volumes,—the first, "Aluminum and Its Production," and the second, "Aluminum Products and Their Fabrication." Together, they form a complete treatise on aluminum. The second volume will perhaps attract the more immediate attention of architects because in it are found the data pertaining to the physical characteristics and properties of the various alloys and forms of aluminum. Obviously, no one can design for the use of any material without such data. There are apparently innumerable aluminum alloys providing physical characteristics and properties for almost every purpose. A recent development is a structural aluminum which is similar to steel in that its resistance to tension and compression is equal. This alloy is rolled in structural shapes, and on account of the great ratio of its strength to weight it has interesting and somewhat revolutionary possibilities. A wide range of finishing and coloring has been developed, and the choice is really selective.

The element of cost must be considered. For some uses the cost per unit of weight may appear as excessive, but with the unusual ratio of strength to weight its use will effect real economies. Aluminum has its limitations; there is no material suitable for universal use. The limitations,—or better, the possibilities of aluminum,—are more fully understood after a reading of certain portions of this work. Real knowledge concerning aluminum, which is essential for its safe use, is attained by the same processes that such knowledge is attained about any other material. This work supplies the knowledge which is essential to the use of the material in connection with building construction and furniture manufacturing. We may hazard the opinion that notwithstanding the vast amount of research that has been made by the producers, architects will lead aluminum into unanticipated fields and with success.

THE ALUMINUM INDUSTRY. By Junius David Edwards, Francis C. Frary and Zay Jeffries, and Experts from the Staff of the Aluminum Company of America. 2 vols., 358 and 870 pages, 6 x 9 ins., cloth, illustrated. Price, $12. McGraw-Hill Book Company, Inc., 370 Seventh Avenue, New York.

PROFESSOR MUJICA, an eminent South and Central American architect, has produced a monumental history of the skyscraper. The collection of historical data is complete and well arranged. The skyscraper is considered in its structural and æsthetic development from the '80s up to the present time, and in fact some of the buildings illustrated are now in the process of completion. The opposition to the skyscraper, even in its early days, by some of the leading architects of the time is shown by their writings and also by the opposition of some leading contemporary architects. The transitions in design in the evolution of this type of building are all recorded in chronological sequence.

The effect of the skyscraper on the requirements for adequate sunlight, circulation of air, safety from storm and fire, durability, street congestion and public welfare, is all recorded by quotations from various writers. Some of these expressions are extremely interesting in the light of present-day knowledge and experience. It is a dispassionate and unbiased exposition of every feature of skyscrapers arranged progressively up to this time. A very comprehensive illustration of the development of the skyscraper is given in the 134 plates and is in fact an authentic pictorial history.

The author introduces his work by advancing a theory as to the ultimate American style of architecture. He shows that from the sixteenth to the twentieth century the forms of indigenous architecture found in Central and South America were entirely disregarded,—in fact unknown to us,—in the growth of American architecture. He conceives the idea that a Neo-American style can and will be developed, based on these native forms. Very interesting illustrations are given of details and restorations of ancient buildings made by Professor Mujica. The question arises as to why a Neo-American style should develop from these ancient Central American styles, rather than an American style entirely germinated by the conditions that are particular to our own times. As a history of the most distinctive feature of American architecture, confined to its æsthetic design, this work is complete and well presented.

HISTORY OF THE SKYSCRAPER, by Francisco Mujica. 53 pages of text, 134 plates, 13 x 17½, leather. Price $35. William Helburn, Inc., 15 East 55th Street, New York.

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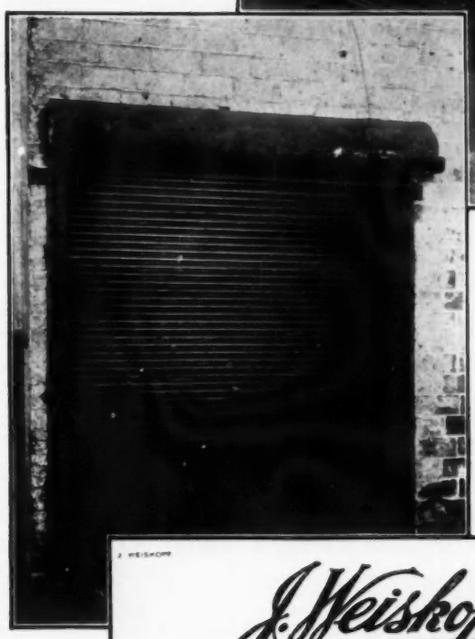
—yet they stopped two serious fires!



Unretouched photographs, taken April 8th, 1930, of the Kinnear Automatic Rolling Doors installed in the Weiskopf Building in 1912, as they appear after eighteen years of continuous service and fire protection duty.

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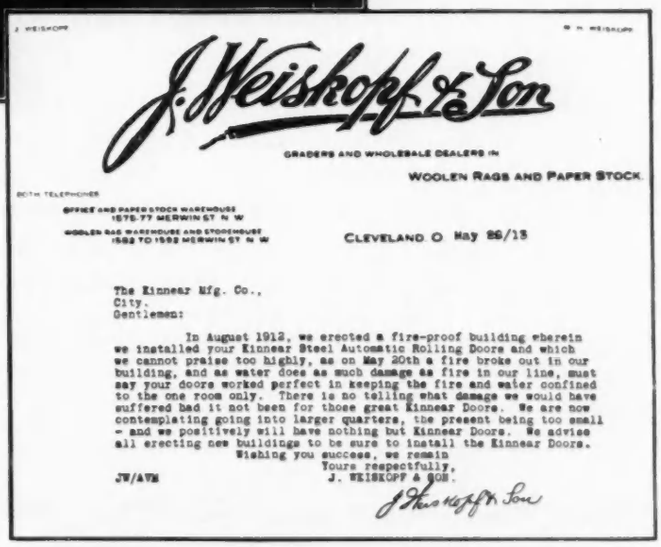

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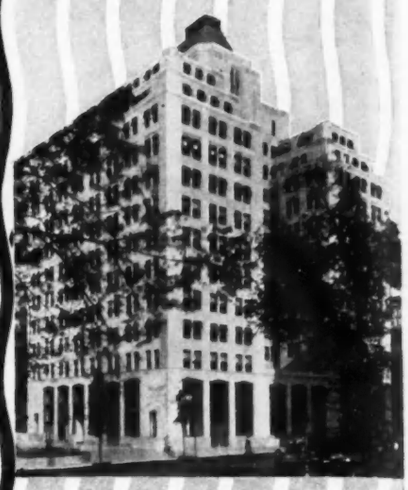
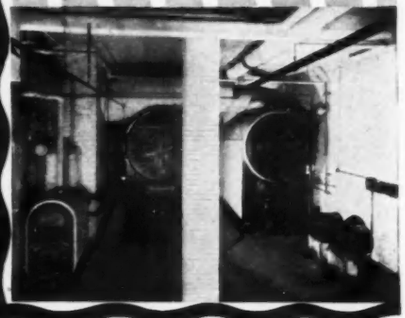


Tower Building, Washington, D. C.
Architect—Robert F. Beresford
Heating Engineer—Robert Mayo, Jr.
Heating Contractor—Isadore Freund
Illustration below—Heggie Simplex Boilers and Refuse Burning Water Heater installed in this building.



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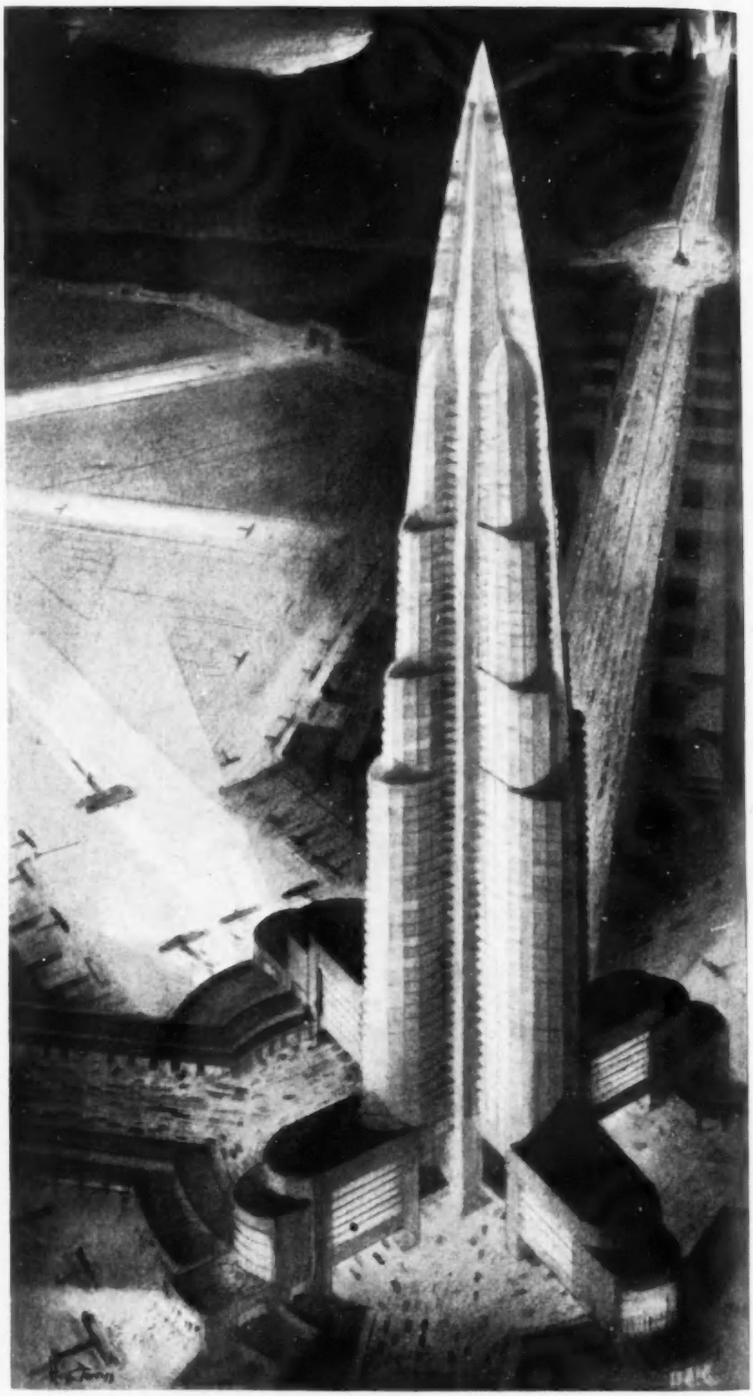

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THE EDITORS.

SKY-WORKERS

FROM A DRAWING BY PAUL BISSELL, JR.

UNIV. OF MICH.

THE
ARCHITECTURAL
FORUM

VOLUME LIII NUMBER TWO

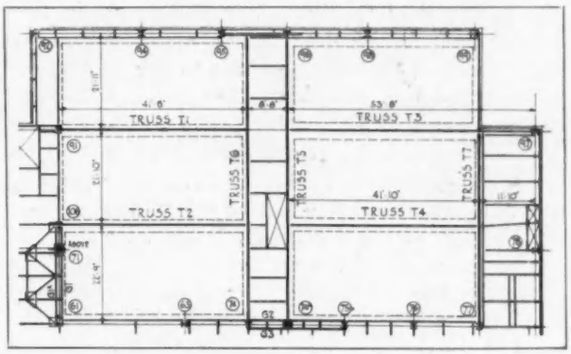
AUGUST 1930

STRUCTURAL FEATURES OF THE WEST SIDE Y. M. C. A.

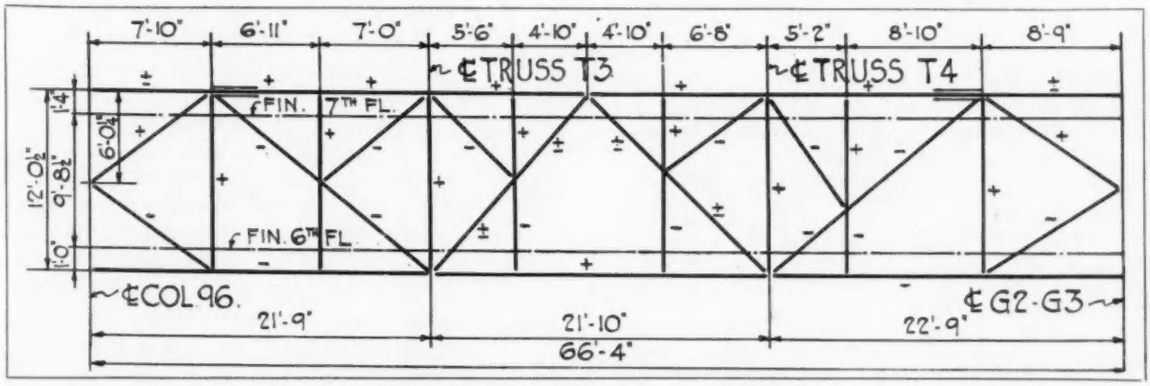
BY
A. T. NORTH

THE inclusion in a building of extremely large rooms, in juxtaposition and used for different purposes, presents some interesting structural problems that require judgment and skill in their solution. The new West Side Y.M.C.A. Building, New York, is such a structure. Above the swimming pools, extending through the second and third floors, are three gymnasiums extending through the fourth and fifth floors, and above the larger gymnasium are six handball courts extending through the sixth and seventh floors. The floor area occupied by the gymnasiums and their separating corridors is about 11,500 square feet, and the construction above is supported on four interior columns.

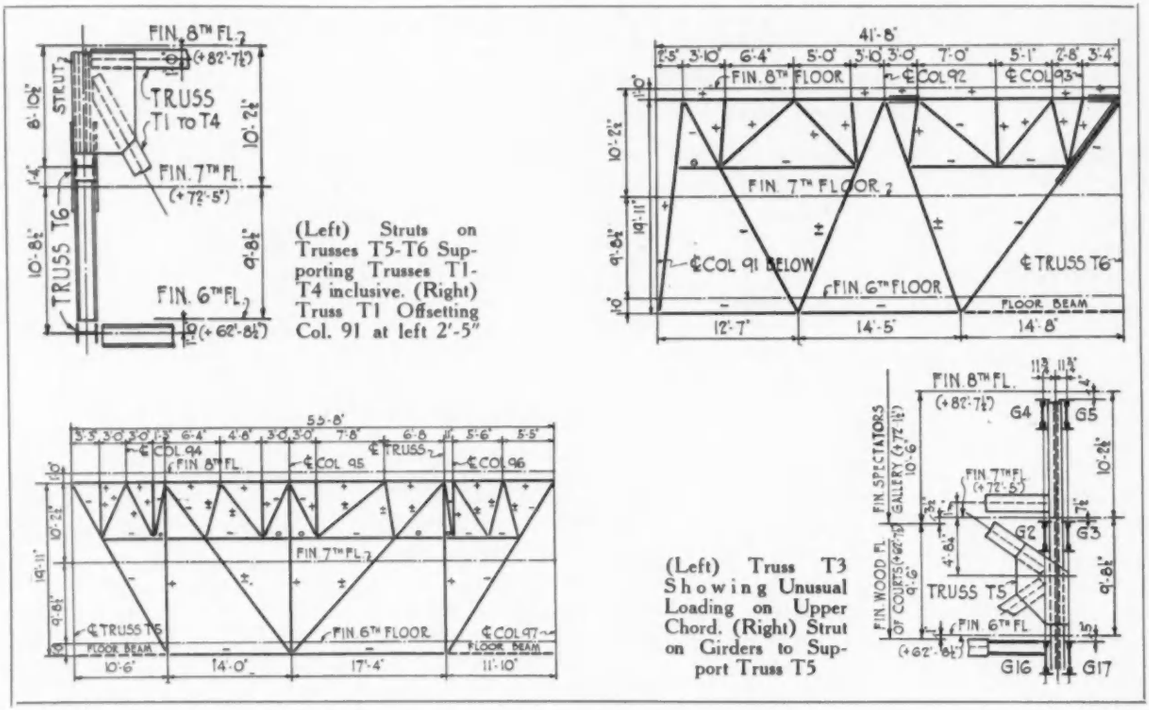
The unobstructed floors of the gymnasiums are obtained by using seven steel trusses which extend through and between the two-story handball courts. The longer transverse trusses are 12′ 0½″ high on center lines of chords. The four longitudinal trusses are 19′ 11″ high on center lines of chords. All of these trusses are level on the bottom and the longitudinal trusses extend 7′ 10½″ above the transverse trusses. They are supported at the ends of the top chords by struts supported on the top chords of the trusses below. This scheme made it possible to use a rather unique form for the longitudinal trusses T1 to T4 inclusive. It will be seen that they practically consist of two trusses in one, and the reasons therefor are obvious. A large number of irregularly spaced concentrated loads are supported on the upper chords and compression web members are placed under each of these load points. These loads are distributed through subsidiary trusses that are about 6′ 8″ high, the reactions of which are carried into the deeper principal truss, which is 19′ 11″ high. The ceiling of the gymnasium and floor of the handball courts are supported by the lower chords of these trusses.



Framing Plan of Trusses



Truss T5, T6 Similar, Supporting Trusses T1-T4 inclusive



(Left) Struts on Trusses T5-T6 Supporting Trusses T1-T4 inclusive. (Right) Truss T1 Offsetting Col. 91 at left 2'-5"

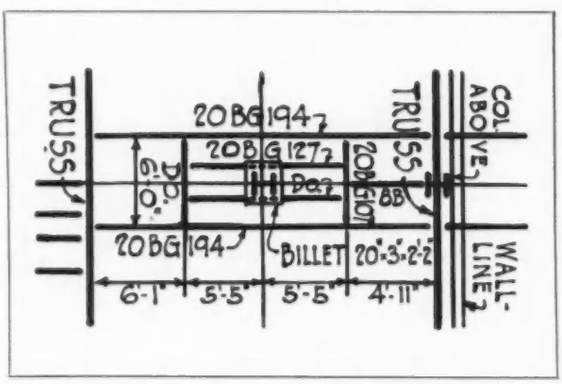
(Left) Truss T3 Showing Unusual Loading on Upper Chord. (Right) Strut on Girders to Support Truss T5

Above the handball courts, eight columns supporting the upper floors are supported between the longitudinal trusses on baskets or huddles of beams. It was necessary to limit the depth of the supporting steel to 20". As will be seen in the illustration, 20 BG floor beams are arranged so as to transmit the column loads to the trusses or other supporting members. On top and in the center of this basket or huddle is placed a 20 x 3" x 2' 2" steel billet, which serves as a base plate for the superimposed column. This construction was not economical, but it was a logical construction design within the height limitations.

The floors about the swimming pools are 5' 0" above the general second floor level, with spectators' galleries at the third floor level. The bottoms of the pools at their greatest depth are below the second floor level. The pools are lined with 3/8" steel plates welded to a structural steel cradle. The cradle floors are composed of longitudinal I beams supported by and coped into transverse I beam girders. The side walls of the pools are made of vertical I beam struts supported on the transverse girders, and between the vertical struts horizontal I and channel beams are placed. All of the members are designed to support the dead loads and the hydrostatic pressures.

Before the inner walls and floor of the pools were finished with gunite and tile, the pools were filled with water to test their tightness and were kept filled for some time to permit the welded steel tank to adjust itself to the loads. It is reported that in the case of a pool that was finished without adjusting the welded steel tank to the water loads, the tile lining cracked some time after the pool was filled with water. It is but reasonable to expect that some distortion, if you please, will take place in the tank lining under load, and obviously it is good practice to adjust the lining to load before installing the inelastic gunite and tile finish.

This building is an example of the inclusion of complicated structural steel within certain fixed and unusual architectural limitations, and is evidence of the versatility of engineers and the adaptability of structural steel to unusual demands. Weiskopf & Pickworth, Consulting Engineers, designed the steel work, which was detailed by Steinmetz & Rice and fabricated and erected by the Harris Structural Steel Company.



Steel Huddle for Column Base

HEATING AND VENTILATING THE Y. M. C. A.

BY
ALBERT L. BAUM
OF JAROS & BAUM, CONSULTING ENGINEERS

THE West Side Y. M. C. A. was designed to have among its facilities a very large physical department, including two swimming pools, three large gymnasiums, six handball courts, and a number of other facilities. In addition, there are sleeping accommodations for 600 people and a large cafeteria. All of these various forms of service combined make a heavy hot water demand.

One of the first considerations in the design of the mechanical equipment was the selection of the type of boiler and generating plant, if any. A careful analysis was made by studying actual data from other Y. M. C. A. buildings. From this information, graphs were prepared indicating the daily fluctuation of hot water demand, electrical demand, and the various steam demands. These graphs indicated that the amount of low-pressure steam available from a private electrical generating plant would take care of the heating of the building in winter and the supplying of the hot water service throughout the year with a comparatively small waste of exhaust steam in summer, even allowing ample interest and depreciation charges on all the necessary equipment. It was found that the saving to the Y. M. C. A. of the private electrical generating plant was great enough to pay off the first cost of the generating plant within the first four years.

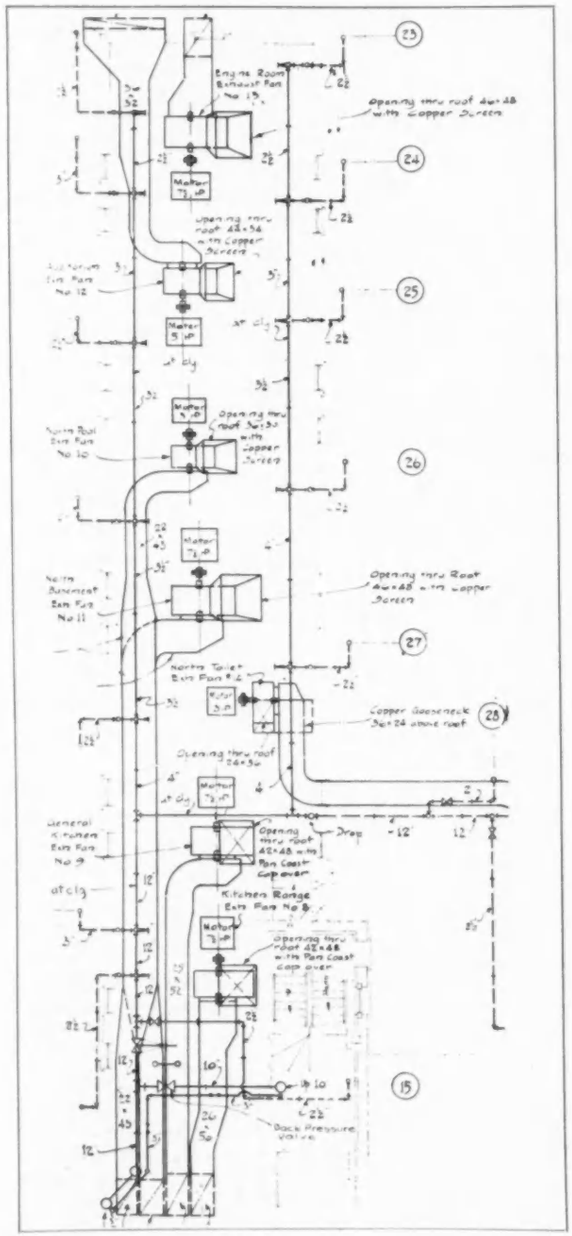
Consequently, an electrical generating plant was installed. The high-pressure boiler plant to provide all the necessary steam for the various services was made a water-tube boiler installation, stoker-fired, burning a mixture of 50 per cent anthracite dust, and 50 per cent bituminous coal. This combination was selected for the highest over-all efficiency. To further facilitate the coal handling problem, conveyors were installed to take the coal directly from the coal storage bins, and deliver it into the stoker hoppers.

With the atmospheric relief riser from the engines running to the roof of the building, it was determined to make the low-pressure steam heating system a down-feed system with the distributing low-pressure main located at the top of the building, and starting right next to the back-pressure valve. This low-pressure distributing steam main is illustrated on the roof plan herewith. To further facilitate the maintenance of plant economy, the steam heating system was made a vacuum return line installation, thus effecting a minimum back pressure on the engines. It is of interest to note that the heating system is arranged so that heat can be maintained in the physical department even though the heating system is shut off for the rest of the building. This has the advantage of removing the slight chill in spring and fall when such heat is desired in the physical department, whereas the remainder of the building does not need to be heated. As the owners were particularly interested in the distribution of steam demand through the building, all the various steam services were metered, thus making it possible to properly charge each department with its steam, water, and electrical demand.

The location of the physical department part way up in the building introduced some exacting structural conditions due to the large open spaces required in such places as the gymnasiums, coupled with the fact that above the gymnasiums the dormitory sections were located. This arrangement created a very interesting problem of carrying the structure above the gymnasiums, and for this purpose the steel engineers designed some heavy steel girders. These girders in turn required the offsetting of a number of steam distributing risers for the heating system in order to clear the mass of steel and concrete caused by the use of the girders. The sixth floor plan illustrated herewith shows one of the many cases of this kind encountered. This type of offset was also a contributing factor in the selection of the down-feed, low-pressure steam distributing system, since the down-feed method eliminated the problems of dripping long steam riser offsets, which would have been the case with an up-feed system.

One of the interesting ventilating features in the building is the use of unit ventilators for the two swimming pools. While the use of unit ventilators was dictated primarily by the tightness of space conditions, it was found during the first winter's operation that this method of combined heating and ventilating for the swimming pools was very effective and efficient. Automatic temperature regulation was used so as to hold the temperature in each of these rooms at about 80 to 85° Fahr. The rate of air change caused by the units kept the atmosphere in these poolrooms fresh and pleasant.

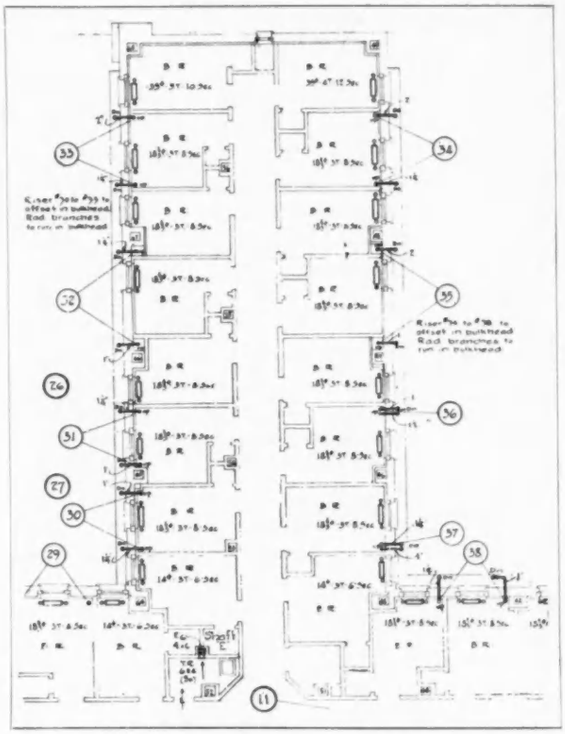
Another interesting feature in the ventilation is illustrated on the roof plan herewith showing the grouping of the exhaust fans in the attic spaces at the top of the building. The north fan room especially lent itself to an arrangement of fans, motors, and ducts whereby easy access to all bearings for oiling purposes was obtainable. This fan room being located over bedrooms, it



Portion of Roof Plan Showing Grouping of Exhaust Fans

was especially important to prevent the sound of operating fans and motors from being heard in the bedrooms below. The small detail of the fan base indicates the method which was successfully used to prevent these fan noises from traveling into the building structure. Essentially, the fan foundations consisted of a sheet lead pan in which the timber frame and natural cork for the fan bases were set, thus avoiding any direct contact between the fans and the structure.

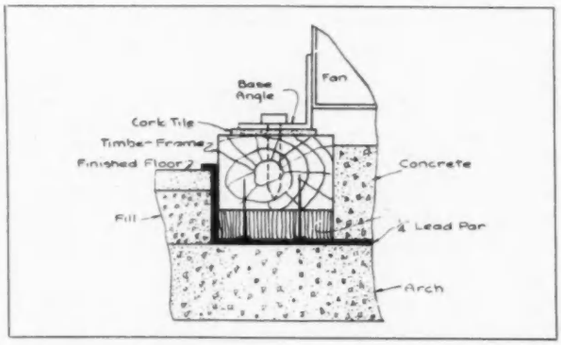
The customary division of the kitchen exhaust ventilation was used wherein a separate fan for



Portion of 6th Floor Plan Showing Branches in Bulkheads on Roof

the range hood exhaust was installed independently of the general kitchen exhaust. In addition to the exhaust, the kitchen was given mechanical air supply.

The cafeteria alongside the kitchen received an excellent architectural treatment, requiring as high a ceiling as possible. For the proper ventilation of this area, therefore, it was determined to use unit ventilators for the air supply and to confine the entire exhaust ductwork over the serving counter. Thus, while the rest of the basement ceiling is quite thoroughly filled up with ducts, pipes, and electrical conduits, the cafeteria, in spite of its location in the basement of the building, possesses excellent headroom.



Detail of Fan Bases to Eliminate Noise

THE Y. M. C. A. SWIMMING POOL EQUIPMENT

BY
A. E. HANSEN
CONSULTING ENGINEER

AMONG the chief attractions of the Y.M.C.A. are the two swimming pools, the large pool for men with 85,000 gallons' capacity, and the small pool for boys with a capacity of 54,000 gallons. The large pool is 25 feet wide by 75 feet long with an 8-foot maximum and a 3-foot minimum water depth; the boys' pool is 20 feet wide by 60 feet long with the same maximum and minimum water depths. Both pools are of steel, lined with concrete, mortar and tile.

POOL EQUIPMENT

The mechanical equipment of the large pool consists of a single-stage, double-suction, centrifugal pump, operating against a net head of 53 feet, driven by a 1720-r.p.m. motor; two pressure filters, built of open-hearth steel, fitted with single-control five-way operating valves with lever and brass dial and with feeding pots for sulphate of aluminum and soda ash. The maximum filter rate is four gallons per square foot; the filter bed consists of three grades of quartz, properly graded and suitable for pressure filter service, the filter sand containing 98 per cent silica A.S.M.E. standard. Filters used in connection with New York water require the use of soda ash to raise the alkalinity of the water in order to make the aluminum sulphate effective; otherwise, the alum will go through the filter without reaction. A pressure gauge is provided on the inlet and outlet ends of each filter unit. When the pressure drop through the filters rises to 15 pounds, the operator knows that the time has arrived for filter washing; the normal pressure drop through the filters when clean is not over 5 pounds.

The large pool is also equipped with a heater of sufficient capacity to maintain the temperature of the pool at 72° Fahr. A liquid chlorinating machine of the solution feed type sterilizes the water. The chlorine solution is purchased from the manufacturers in demijohns, which are kept on hand; a full demijohn is merely placed in position when the demijohn in use is nearly exhausted. The chlorine solution is fed into the pipe supplying the pool inlets after the entire water filtration and heating processes are completed. A lint and hair catcher is inserted on the suction side of the recirculating pump. The large pool has three inlets at the shallow end and six recirculating outlets at its deepest point. These recirculating outlets are also used for draining purposes. Their multiplicity is due to the requirement of the New York Plumbing Code which limits the size of each outlet.

RECIRCULATING EQUIPMENT

With the recirculating equipment installed, the entire contents of the pool are turned over in about 9½ hours. Provision is made to replenish the water lost by evaporation and splashing through the addition of fresh water which may be fed either directly without filtration and heating or by passing it through the filters and heater. The make-up water is, however, sterilized by the chlorinator.

This is the process of recirculation: The recirculating pump takes its water from the six

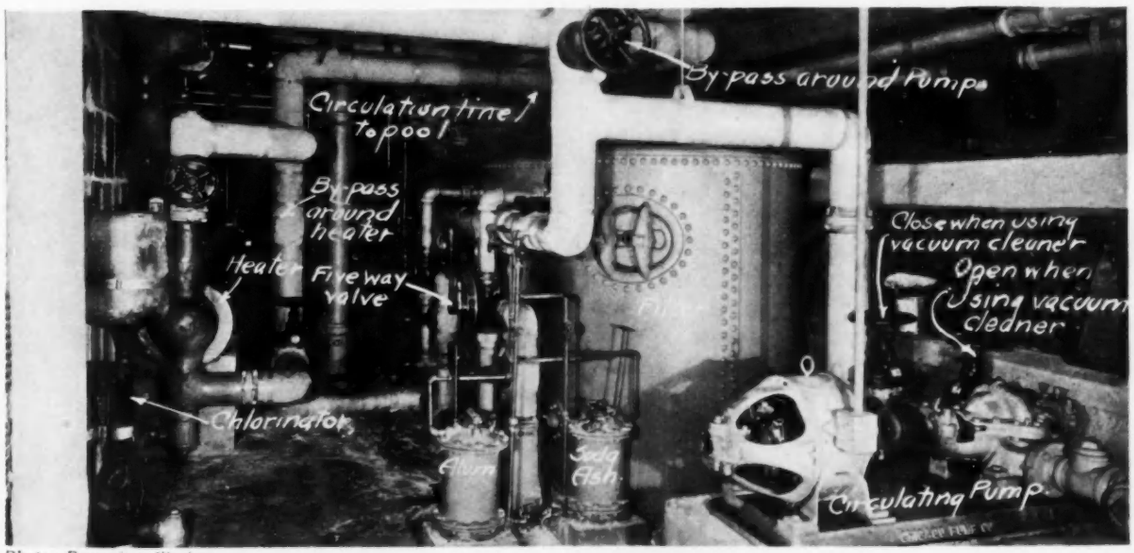
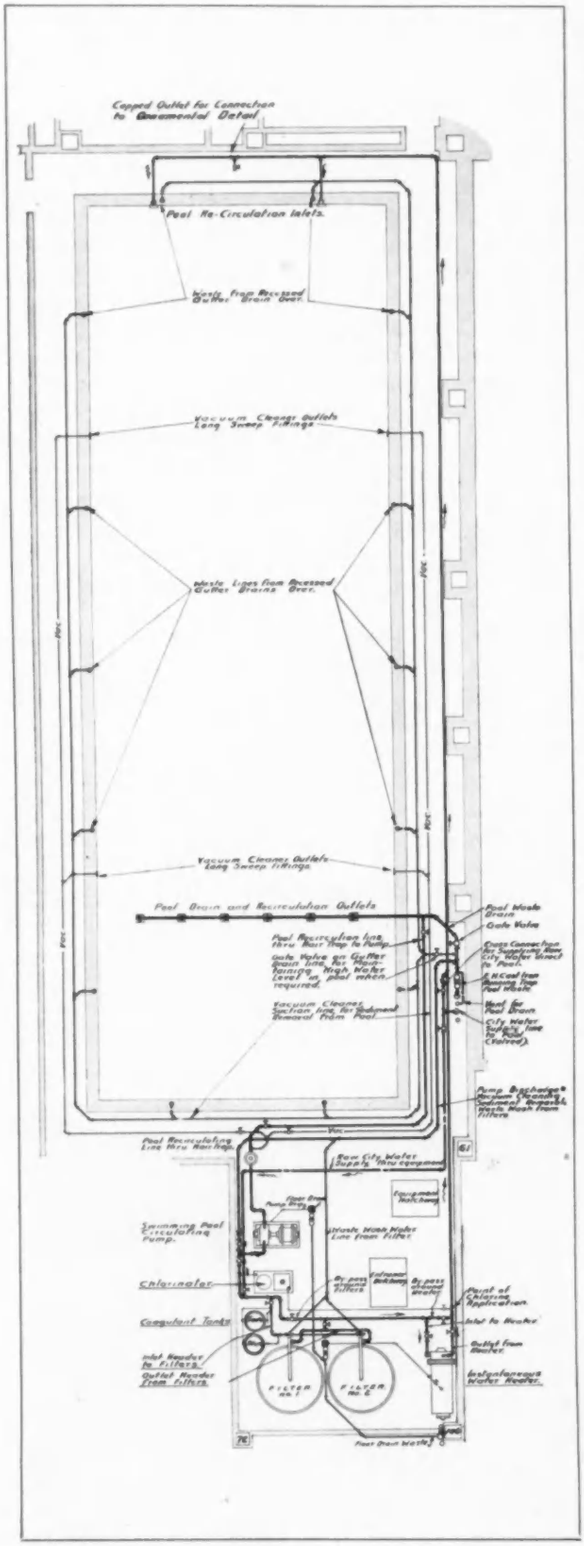


Photo. Browning Studios

Machine Room of the Boys' Pool


Capped Outlet for Connection to Ornamental Detail
Pool Re-Circulation Inlets
Vacuum Cleaner Outlets Long Sweep Fittings
Waste Lines from Recessed Gutter Drains Omit.
Vacuum Cleaner Outlets Long Sweep Fittings
Pool Drain and Recirculation Outlets
Pool Waste Drain
Gate Valve
Cross Connection for Supplying Raw City Water Direct to Pool
Vacuum Cleaner Suction Line for Sediment Removal from Pool
Pump Discharge Backwash Line and Waste Wash from Filters
Pool Recirculating Line thru Heating
Raw City Water Supply thru Equipment
Swimming Pool Circulating Pump
Waste Wash Water Line from Filter
Chlorinator
Point of Chlorine Application
Coagulant Tanks
Inlet to Heater
Outlet from Heater
Inlet Header to Filters
Outlet Header from Filters
Instantaneous Water Heater
FILTER No. 1
FILTER No. 2

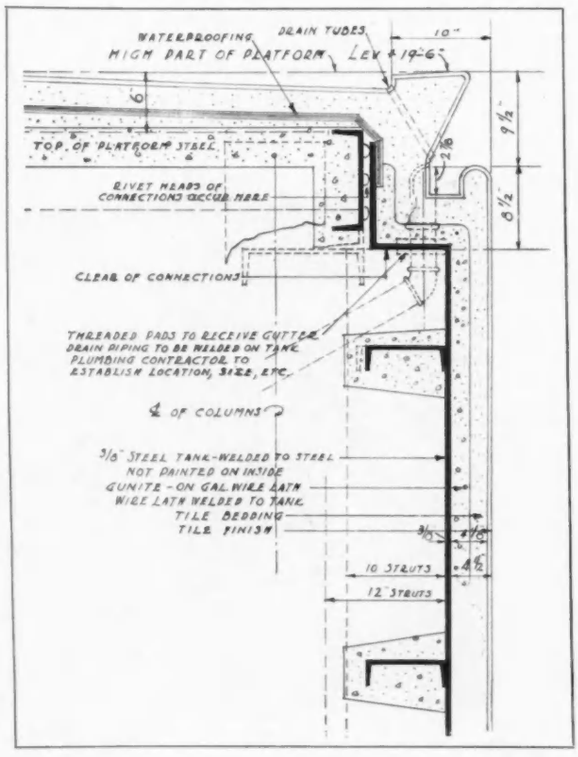
Plan Showing Equipment and Connections of the Large Pool

recirculating outlets at the deepest point of the pool through the lint and hair catcher. It discharges to the filters, taking on its way, first, the required amount of soda ash and then the required amount of alum, depositing the alum floc on top of the filter bed. The water then passes through the two filter units to the heater. From the heater it goes to the pool feed line where it is sterilized by the addition of the liquid chlorine, and is then discharged through the three inlets at the shallow end of the pool.

POOL CLEANING

For cleaning purposes, the pool is provided with four suction outlets located two in each side of the pool below the water line. These outlets are capped when the pool is not being cleaned. These suction outlets are piped along the sides of the pool and connected at the deep end of the pool, entering the pump suction on the pool side of the lint and hair catcher. When the pool is being cleaned the recirculating pump has a valved by-pass to discharge the used pool water through the pool drain to the sewer. The vacuum cleaning equipment, which is attached to the four cleaning outlets, was furnished by the owners and was not included in the plumbing contract. The pool is provided with a scum gutter having 14 outlets located at various intermediate points along the gutter; they drain to the pool drain. To refill the pool when empty with fresh water takes about 5½ hours.

The equipment for the small pool with the



Section of the Large Pool Showing Details of Construction

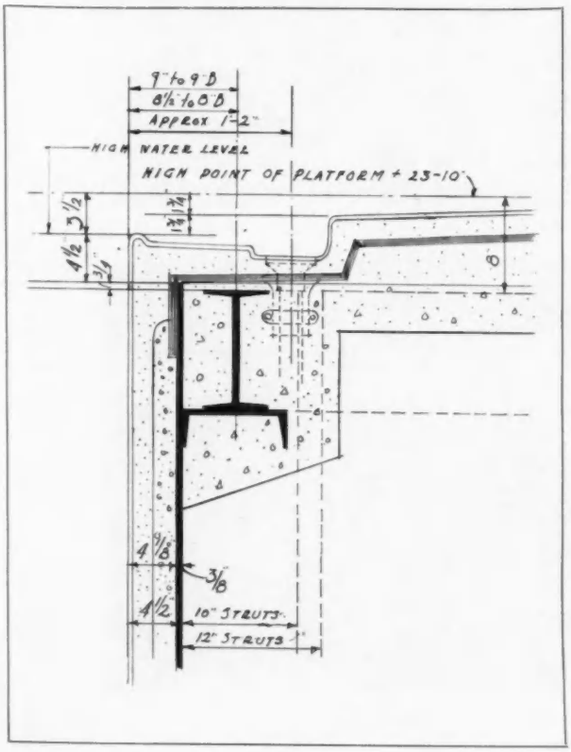
operation of the recirculating apparatus is similar to that of the large pool except that the small pool has five recirculating outlets instead of six, only two vacuum cleaning outlets instead of four, and has only ten instead of 14 scum gutter outlets. The plans and specifications provided for two recirculating pumps for each pool; one of each of these was omitted for economy.

SHOWER ROOMS

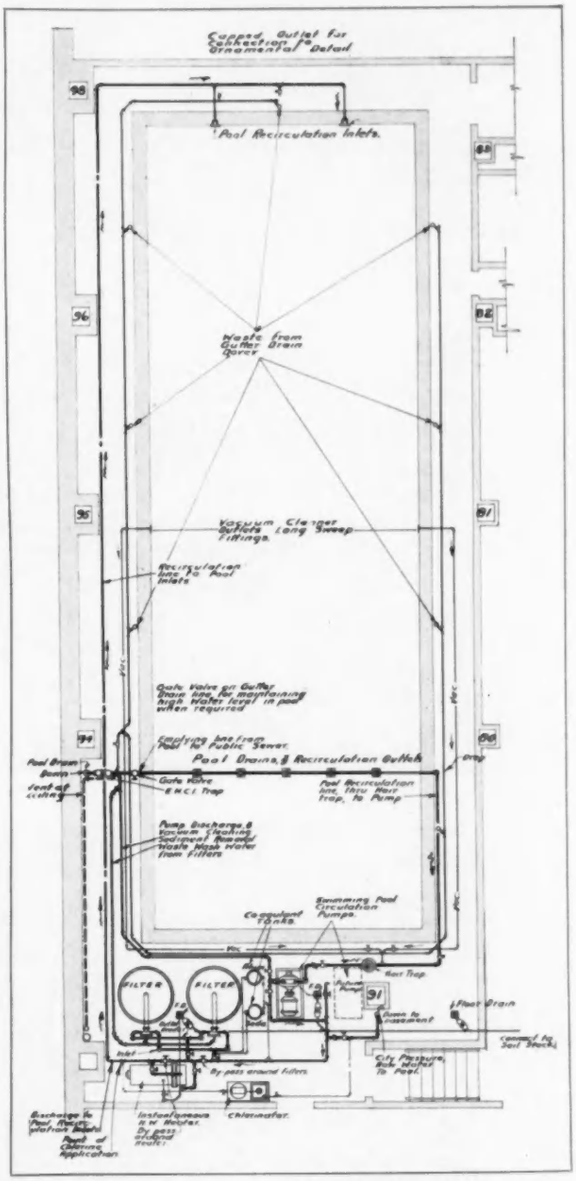
Separate shower rooms are provided in connection with both pools. There are four men's shower rooms containing two small rooms in which are 11 shower heads each and two large rooms in which are 16 shower heads each, making a total of 54. The illustration shows the large shower room for men. The boys have a similar shower room with 16 shower heads. The shower rooms are so located that neither men nor boys can enter the pools without passing through their respective shower rooms. It is compulsory that both men and boys take showers before entering their pools; in the case of the boys, this rule is enforced by an attendant. As will be noted, the shower heads project from the wall at about a 45° angle; each battery of showers is controlled by a thermostatic anti-scalding valve, set at 110° Fahr. Each shower head has its own hot and cold control valves so that the shower may be regulated, but the bather cannot scald himself, due to the thermostatic mixing valve control. It is interesting to note that the hot water supply for all showers in the dormitory portion on the upper floors of the building is controlled by similar thermostatic anti-scalding valves, also set at 110°.

UNIQUE FEATURES

The Y. M. C. A. boasts of its own efficient barber shop. One of the unique features of the plumbing installation in the Y.M.C.A. building is that it contains plumbing fixtures for so many various purposes, such as wall-hung water closets and lavatories; specially designed urinals; drinking fountains; hospital, dentist and chiropodist fixtures; special cafeteria and kitchen equipment; chemical laboratory with its acid-proof waste



Section of the Smaller Pool Showing Flat-type Gutter



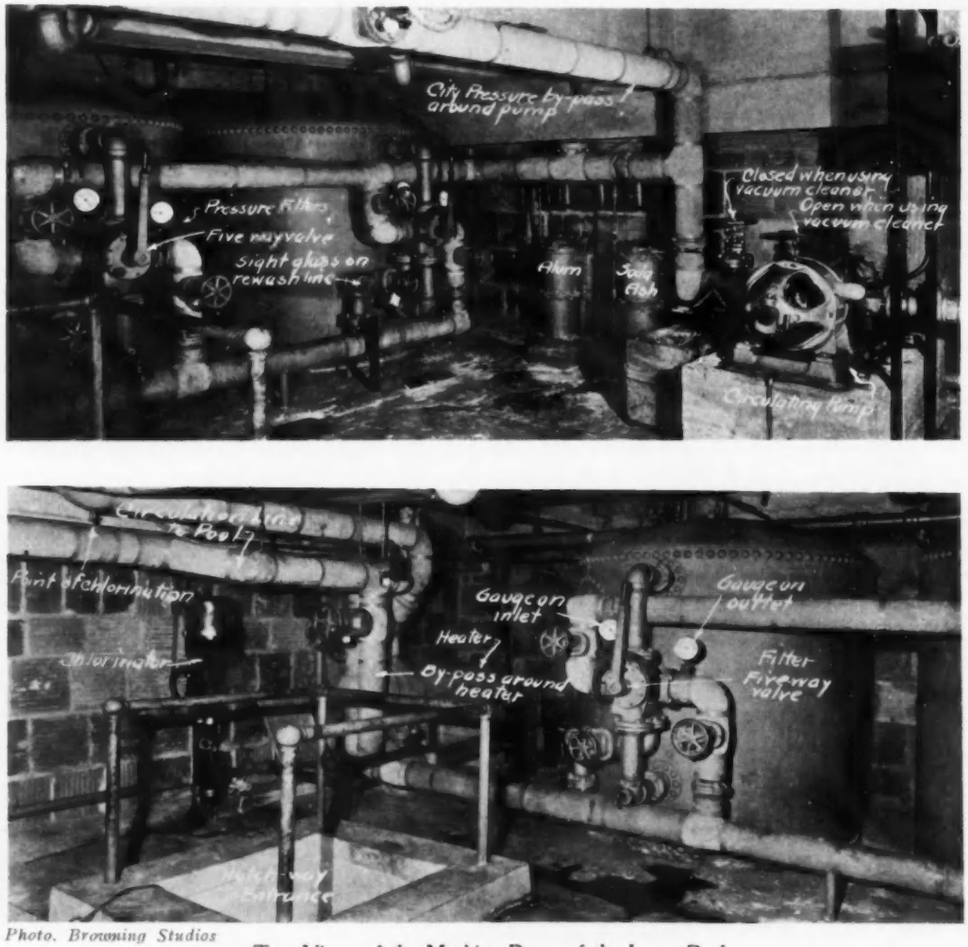
Plan Showing Equipment and Connections of the Smaller Pool

Men's Shower Room Showing Drain Gutter at Wall; Valves at Right of Shower Heads

lines that empty into neutralizing lime boxes before entering the sewer; special cuspidors which are flushed by the waste of adjacent drinking fountains in each gymnasium and in the hand-ball courts; a liquid soap dispensing system for each battery of lavatories; special mop sinks that can accommodate mop trucks, used for washing the floors throughout the building; and an ice water system piped to the various drinking fountains; also, an adequate fire protection system.

MECHANICAL EQUIPMENT

The mechanical equipment for the plumbing in the building, in addition to that described for the swimming pools, consists of two house pumps with their suction tank, three hot water heaters, two hot water circulating pumps, and a central vacuum cleaning machine as illustrated herewith, except that the hot water circulating pumps are located on the right side and not within the camera field. In addition, there is a two-compartment, combination house and fire tank located in the tower, and a refrigerating plant, located in the tower below the house tank.



Photo, Browning Studios

Two Views of the Machine Room of the Large Pool

KNICKERBOCKER

Setting First Basement Columns, April 7, 1930

THE EMPIRE STATE BUILDING

III. THE STRUCTURAL FRAME

BY
J. L. EDWARDS*

THE outstanding structural feature of the Empire State Building is its height, which gives it first place among the world's tall structures. The highest point of the building proper, exclusive of the mooring mast, is 1,092 feet above Fifth Avenue. A comparison of the height and outline of the Empire State and other noted tall buildings is given in Fig. 1, showing, to the same scale, the Metropolitan Life, Woolworth, Chrysler, and Empire State towers. Figures, such as 58,000 tons representing the total weight of structural steel in the building, and 303,000 tons representing the total weight of the completed, occupied building, are impressive, but perhaps other ways of expressing these quantities may give a clearer comparative idea of its size.

If it had been necessary to move all of the steel from the shops to the site, at one time, it would have required a train of heavily loaded cars 11 miles long, and to transport all of the materials used in the building, the train would have been 57 miles long. The structural steel could have been rolled into railroad rails and used to lay a double-track railroad from New York to Washington. Many people have expressed the fear that such tremendous loads of building materials, concentrated in a small area, create a dangerous condition which might result in widespread settlement or shifting of the underlying strata. The absurdity of this is best appreciated by comparing the total weight of rock originally on the site with the weight of the building. If the Empire State site had been originally solid rock, level with the present streets, then the weight of rock removed in excavating for the previous buildings and for the basements of the present structure would be equal to three-

* Mr. Edwards was Engineer in Charge of Design for this building for H. G. Balcom, Consulting Engineer, 10 East 47th Street, New York.

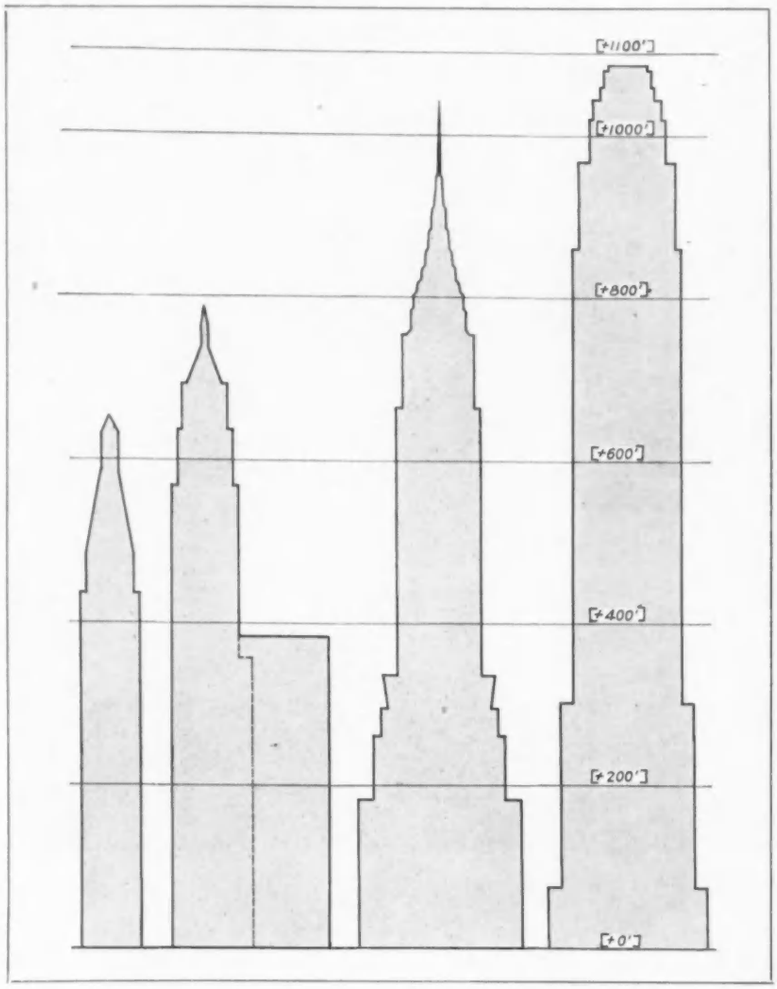


Figure 1. The Comparative Heights and Outlines of the Metropolitan, Woolworth, Chrysler and Empire State Buildings (Left to Right)

quarters of the total weight of the building. A hill of rock 45 feet high over the entire site occupied would be equivalent in weight to the entire building.

The floor framing presents few unusual features. The floor arches are the ordinary 4-inch cinder concrete slabs used so extensively in New York on spans up to 8 feet, and consequently the floor beams are spaced to accommodate this type of construction. Provision was made in the framing to allow for a maximum of four temporary passenger elevators and eight hod hoists to be used during construction. The former hotel building had vaults under the sidewalks which could be utilized for storage and subcontractors' supply rooms during construction, thus releasing space in the interior of the building. To make the space available, the sidewalk was temporarily supported on timber shoring when the old building was demolished. The ground floor framing was designed with double beams extending beyond the columns, which were located 4 feet

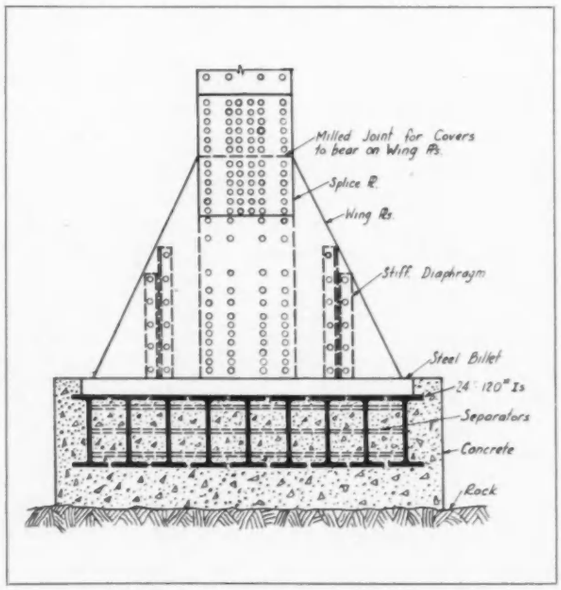
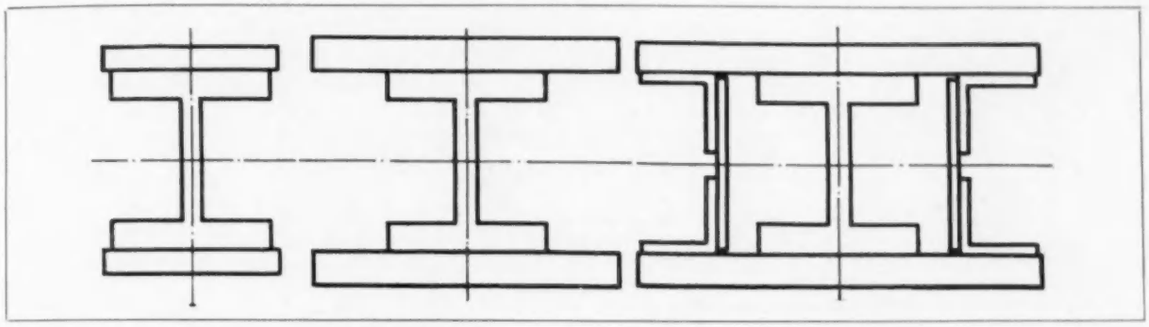


Figure 2. Typical Foundation Grillage



Type 1 Type 2 Type 3

Figure 3. Types of Built-up Column Sections

back of the building line. This arrangement allowed the construction of the building, including building of the first story walls, to proceed before the former sidewalk framing was removed and replaced with permanent steel.

The building columns are all supported by concrete piers extending down into solid bed rock. The column loads are distributed over the concrete piers by means of heavy steel billets alone for loads up to 2,600,000 pounds, and by single-tier, beam grillages with steel billets on top for heavier loads. Where the column loads exceeded 4,500,000 pounds the cover plates were cut at a point 4 feet or more above the bottom of the column, and wing plates of the same thickness as the cover plates were spliced in with milled bearing surfaces in order to spread the load over the grillage beams. A typical column base for one of the tower columns is shown in Fig. 2.

The steel columns used are of three general types, depending upon the loads carried. These are shown in Fig. 3. Type 1 consists of a rolled steel column section alone or with cover plates up to 24 inches wide and 3 11/16 inches thick used for loads up to 4,530,000 pounds. Type 2 consists of the heaviest rolled column with two 32-inch wide cover plates which have their projecting edges supported by diaphragms at intervals of about 3 feet. This type carries loads up to 5,700,000 pounds. Type 3 columns are box columns with a core section of the heaviest rolled column, two plate webs, four angles, and cover plates 32 inches, 41 inches or 42 inches wide. The heaviest column of this type has 693 square inches of steel in cross section; weighs, without adding weight of connections, 2,360 pounds per foot; and supports a load of 10,340,000 pounds. The lowest section of this column is 26 feet, 8 inches long and weighs 44 tons. As far as the writer knows, this is the heaviest column for its length ever used in a building. On account of the large loads and the thickness of material involved, the rivets connecting the various parts of built-up columns are 1⅛ inches or more in diameter.

The great height of the building naturally created a difficult problem in wind bracing. This was simplified considerably by the almost ideal arrangement of columns arrived at by the architects in the development of their plans. Practically all of the main column lines are continuous, and none of the tower columns are offset. The number of columns carried by girders is surprisingly small for a building of its size in this day of setback building construction. The building was designed to resist a wind pressure of 20 pounds per square foot on the total area above the sixth floor, and in addition a pull of 50 tons which might be produced by anchoring a dirigible at the top of a mooring mast to be placed on the roof.

The bracing used was of two types. First, in the interior of the building adjacent to elevator

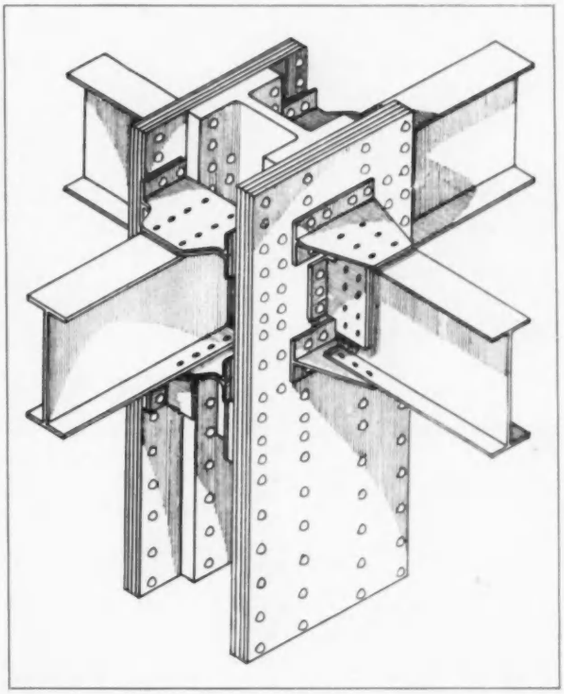


Figure 4. Typical Wind Bracing Connection

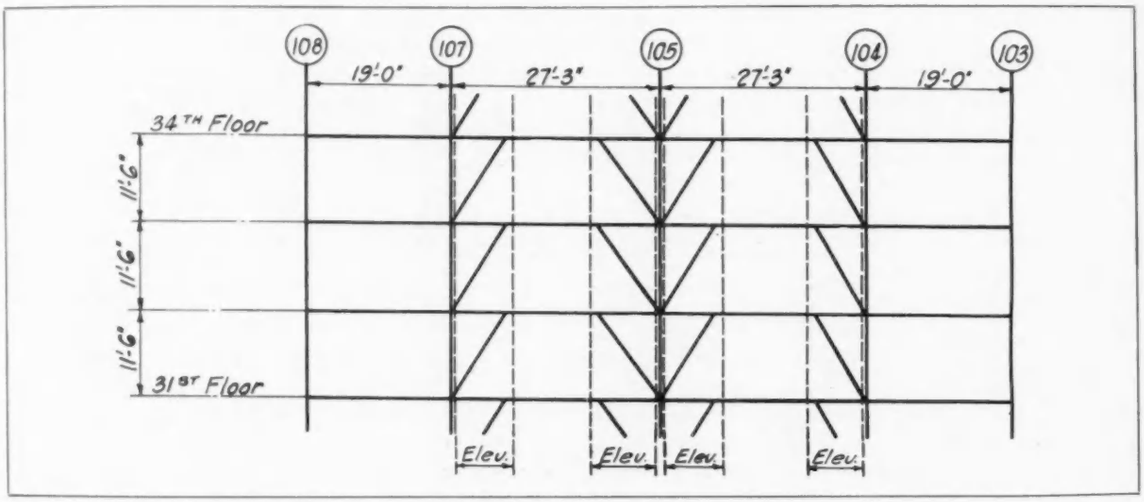


Figure 5. Typical Knee Bracing, Looking East

shafts, knee braces were used extending from the top of one beam, at the column, to the bottom of the beam above at a point as far out as possible without having connections encroach on the ceilings of elevator halls. Since this bracing acts as a partial support for the girders, these members were designed taking this into account, and the sizes are in some cases smaller than would have been required without knee braces. Where knee braces were not permitted, and for constructions carrying smaller wind moments, the stiffening was obtained by using beam stubs or angles riveted to the top and bottom flanges of the beams as shown in Fig. 4. A diagram showing the bracing on one of the north and south column lines in the tower portion is shown in Fig. 5. This shows how the knee braces were used in the center of the building. A typical floor plan for a lower floor is shown on which the location of knee-braced panels are indicated (Fig. 6). In distributing the wind shears among the columns, the direct wind loads were assumed to be pro-

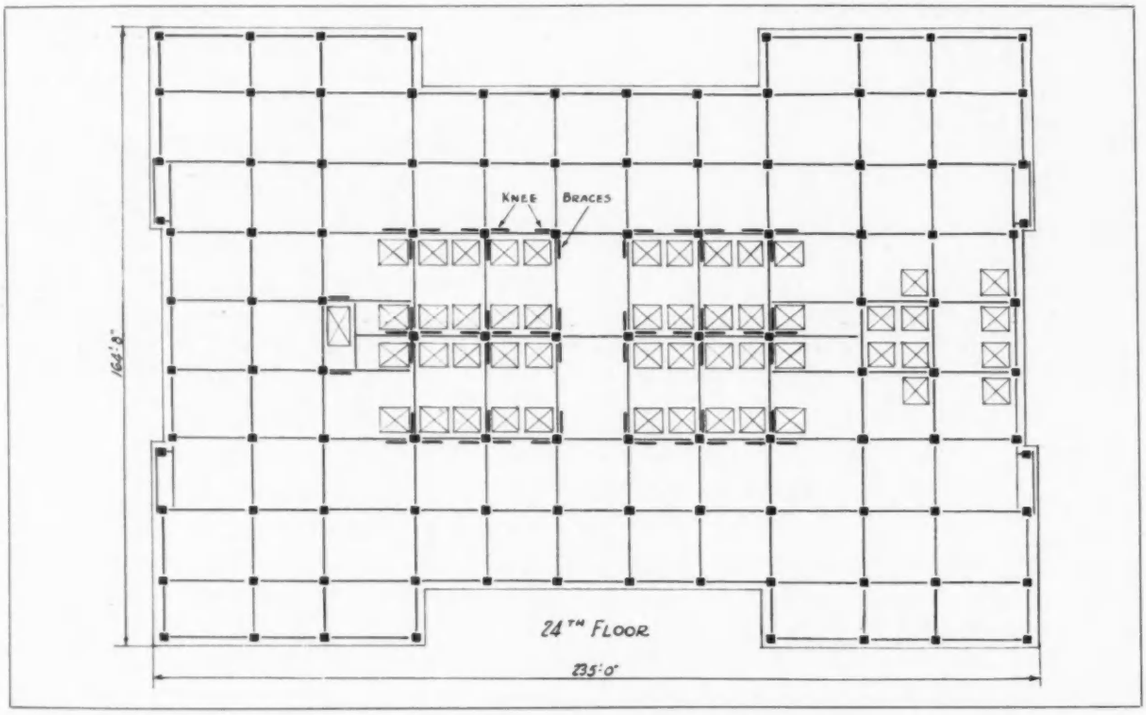


Figure 6. Plan Showing Location of Wind Bracing

KNICKERBOCKER

Nearly 30,000 Tons of Steel Set by June 9, 1930

portional to the capacity of the columns in resisting overturning moment. The direct stresses in the columns vary in a straight line from zero at the center to a maximum at exterior columns, and the total loads depend both on area of section and distance from the center. After the shears were determined by this method and the moments calculated, the various members were designed with such relative stiffness as to follow approximately the same horizontal movement at each column under wind loads. Knee braces were used at the back of the elevator shafts in the east and west direction up to the 71st floor and at the sides of the shafts, in the opposite direction, up to the 68th floor.

The total wind pressure on the north or south faces of the building is figured to be 4,340,000 pounds, of which 318,000 pounds, or a little over 7 per cent of the total, represents the wind pressure on a mooring mast and the pull of a dirigible anchored at its top. For the lower columns the direct wind stress due to the mooring

mast loads is about 23 per cent of the total due to their relatively greater share in producing overturning moments. An attempt will be made to measure accurately the wind stresses in some of the columns and girders during high winds by reading, with sensitive instruments, the shortening or elongation of the steel. On account of the symmetrical column plan and the relative simplicity of design, the results obtained from such tests should be highly valuable in determining how closely actual stresses agree with those arrived at by theoretical calculations.

On account of the size of the project, which required an enormous amount of work to be done in a short period, it was of prime importance to schedule all work carefully. Erection of steel was scheduled to begin on April 1, and the roof framing is planned to be completely erected by September 1. The first small scale architectural plans for use in making the structural design were completed about the middle of November. Two months later, in the middle of January, the first steel plans, showing grillages and lowest tier of columns, were turned over to the steel contractors, and information was given to the men working on the site to enable them to begin work on the necessary concrete column foundations and walls. Completed structural design drawings for steel were furnished to the contractors at frequent intervals, several floors at a time, so that they could proceed without delay in their work of preparing detail drawings and fabricating steel. The structural design was completed to the roof over the 85th floor by the middle of June.

Except where built-up sections were necessary, Carnegie Broad Flanged Sections were used. All steel was furnished by the Carnegie Steel Company and was largely rolled at their Homestead plant in Pittsburgh. Though the schedule allowed about five months for complete fabrication, the erection schedule necessitated the fabrication of about 15,000 tons for each of the two first months. In order to avoid any possibility of delay, the fabrication was divided between the Ambridge, Penn., plant of the American Bridge Company, and the Rankin, Penn., plant of the McClintic-Marshall Company. If the American Bridge Company had done all the fabrication, it would have required practically the entire facilities of its Ambridge plant, which is its largest mill, to keep pace with the schedule. The fabrication was divided between the two fabricators in alternate groups of six or eight floors.

The steel work is being erected by Post & McCord of New York. In the beginning when the building covered the entire site, nine derricks were used, five of a 30-ton rated capacity and four more of 20-ton capacity. To handle several of the larger pieces, two derricks were necessary. Photograph No. 133, taken on April 7, shows the first columns in the basement being set. Photograph No. 205 shows the condition of the work on June 9, about two months later. In this time, nearly 30,000 tons of steel had been set, or about 50 per cent more than all the steel required for the 40 Wall Street Building, or for the Chrysler Building. Due to the large size and simplicity of construction, this building set a per-ton speed of erection which is greater than any before attained on building work and has set a record which will probably stand for a long time.

The structural steel painting followed the usual standard for this type of work, consisting of an iron oxide and linseed oil paint for the shop coat, which protected the steel during transportation and erection, and an asphaltum paint for the field coat which is alkali-resisting and will not break down when brought in contact with cement. The floor construction steel was fireproofed throughout with cinder concrete, as is usual when cinder concrete floor arches are used. The exterior columns above the street level were fireproofed with 4 inches of brick work. The basement columns and the lower story interior columns, where the fire hazard is great, especially during construction, were fireproofed with cinder concrete. All other columns are fireproofed with 2-inch terra cotta blocks.

TRAVERTINE AND ITS IMITATION

BY

CLIFFORD W. SPENCER

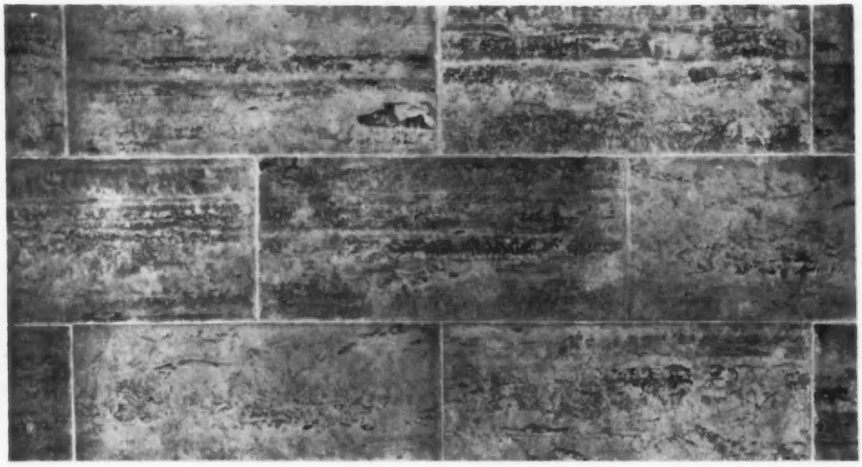
OF PEABODY, WILSON & BROWN, ARCHITECTS

SOME 20 years ago considerable interest and curiosity were expressed by many of those interested in architecture as to the nature of a new kind of building stone that was being used in the interior of the new Pennsylvania Station in New York. Although this material had already been used in the beautiful Della Robbia Room of the Vanderbilt Hotel, and perhaps in one or two other small installations, its use in the Pennsylvania Station was the first case to arouse widespread interest and speculation. The stone was of a warm buff color with laminated markings of darker tone, and it showed in its surface just enough imperfection in the form of bubble holes, somewhat similar to those in Swiss cheese, to lend interest and variety to wall surfaces.

At first few of those who noticed the material realized that it was a variety of calcareous tufa known as travertine, of which so much is to be found in and about the Roman Forum. In fact, it came from the same district that furnished the travertine of which the exterior of the great *Amphitheatrum Flavium* or Colosseum and many other Roman edifices and early churches, including St. Peter's, were so largely constructed. Having been thus formally introduced into this country, its popularity increased so rapidly that at the present time many large buildings and not a few smaller structures make use of it to a greater or less extent. Its use as ashlar and ornamental work in banking rooms, office building lobbies, apartment house entrances, and various other places is well known, and its non-slipping and long wearing qualities as flooring material have had a thorough test under the countless feet that pass over it daily in the Grand Central Terminal and other public buildings.

NATURE OF REAL TRAVERTINE. In spite of the great amount of travertine used, there is surprisingly little general knowledge as to its nature. If asked what travertine is, a great many, even among architects, will say that it is a volcanic rock or a sort of lava. This impression is probably due to the fact that the bulk of commercial travertine comes from the Tivoli district of Italy, which is in close proximity to extinct volcanoes, and that most other great deposits occur in volcanic regions. As a matter of fact, travertine is a deposit from lime springs or other lime-bearing waters. In the case of the Tivoli deposit, it was from a great lake that existed in that region at the close of the period of volcanic activity. According to Lyell, Bischof and other eminent geologists *Lapis Tiburtinus* was formed by precipitation of calcareous matter from water charged with carbonic acid gas. The gas accounts for the cellular and porous nature of the stone. More richly figured and compact varieties of this precipitation are known as onyx marble and alabaster. Hot springs are especially productive of this form of calcareous tufa. Deposits of travertine are found in all parts of the world, including the United States. Domestic travertine is of good quality and compares favorably with many types of imported stone. Minnesota and Colorado produce a good quality of travertine which has been used in large quantities and there are many undeveloped deposits in other sections of the country, notably one in Georgia, which is about to be made available for use. In general, the domestic product is slightly grayer in color than most of that imported.

As in the case of marble, there is a tendency toward the use of the more exotic and richly marked varieties of travertine, and we find an increasing number of hotel lobbies and other public places decorated with such special varieties as Siena travertine, which is warmer in color and more strongly marked with dark veinings and takes a high polish. Then there is Travertine Fleuri of about the same color value as Roman travertine but having strong yellowish markings. Travertine D'Or is of a warm brown color, and a still darker variety is known as Travertine Antique. The use of black travertine in this country is quite rare but its decorative possibilities are important. These are only a few of the variations in color and markings which are available to the architect in search of new and pleasing effects. Most of these varieties are used with a polished surface, but they are also very effective with a honed finish. The Roman type, which constitutes the bulk of travertine used in the past, is seldom polished, being more attractive in a rough sanded finish. The quarrying processes for travertine are about the same as those employed in removing marble from the earth, travertine having the advantage of being quite soft when first removed and becoming harder on exposure to the air. This quality is dependent largely on the age of the deposit. In the case of more recent deposits, it can almost be cut with a



Artificial travertine ashlar, closely resembling the natural stone

shovel, while in other cases the deposit has been formed so long that it has attained such a hardness as to make quarrying operations quite difficult. Italian travertine is usually imported in block form to avoid loss by breakage and to secure the advantage of a lower duty.

ARTIFICIAL TRAVERTINE. As is natural in the case of such a popular building material, which must be brought from a great distance and is therefore quite expensive, the reproduction of travertine by the use of plastic substances has become very extensive, and the usual practice of cheapening these reproductions to meet competition has filled our cities with installations which, to say the least, are not pleasing. These abuses have given rise to the mistaken impression in the minds of a few architects that all imitation of travertine is to be avoided. In the early days of use of imitation travertine, some installations were made which have since turned out to be rather unsatisfactory. It must be remembered, however, that at that time very little was known about the making of imitation stones of any kind, and that work done then was of a highly experimental character. Artificial travertine was used in connection with the real stone in the Pennsylvania Station, and since that time new manufacturing methods and materials have been introduced from time to time so that now it is possible to produce an imitation stone that is said to have all the advantages of real travertine at a considerable saving in cost.

The various types of artificial travertine can be roughly grouped into three major classes, not including the many plastic paint preparations by the use of which a travertine effect is often obtained. They are, first, the more carefully prepared pre-cast imitations which match the genuine stone in all respects; second, other pre-cast products which only approximate the appearance and physical properties of real stone; and, third, the work which is applied directly to the wall in the

Newark. Guilbert & Betelle, Interior North Ward Bank, Architects

Carved and moulded decorations are easily executed in artificial travertine

same manner as ordinary plaster and then given a travertine effect by some one of the many processes which will be described later.

MATERIALS used include gypsum plaster, Keene's cement, and in rare cases Portland cement. These are mixed in some instances, and many manufacturers have secret formulæ, some of which make use of one or more of the materials named. Some manufacturers produce a high grade artificial travertine, using a large proportion of marble dust and aggregate mixed with a secret-formula binder, which does not contain either Keene's cement, gypsum or Portland cement. There are also available on the market ready-mixed and colored travertine plasters, which any plasterer can buy and apply in his own way. The travertine color effect is attained by the use of mineral colors, usually having some form of iron oxide mixed with the cement or plaster. An advantage of the use of artificial travertine lies in the way in which the color variation can be controlled. If it is desired to have walls of uniform color and shade, it is easy to obtain it, or the various slabs may show any range of color variations to meet the architect's wishes. There have been some cases where the coloring has been forced or made unnatural to agree with some particular treatment, while the travertine texture is retained. This practice, however, is not to be commended as a general procedure. Cements employing a magnesium base have also been used, but it is generally conceded that work done with this material is subject to shrinking, expanding or warping due to the tendency of the magnesium to remain active, and to the large amount of moisture which is absorbed. It is possible that this material is used in some of the secret formulæ, and that by experimentation the unfavorable features have been corrected. The magnesium base cement has the advantage of being very hard, and if its faults could be corrected, it would be ideal material for such work.

Dime Savings Bank, Brooklyn. Halsey, McCormack & Helmer, Architects

The warm color and the texture of travertine make it especially desirable for interiors

PROCESS OF MANUFACTURE. There are numerous ways of imitating the texture and markings of travertine in the various materials. Perhaps the most satisfactory method is to cast the slabs in moulds taken from carefully selected samples of actual travertine. This method has the advantage of reproducing exactly the markings of travertine, but care should be taken that a sufficient number of matrices are used so that "repeats" are not noticeable in the finished wall. In the case of moulded or carved work it is not profitable to carve the matrices from real travertine unless the same motif is to be repeated a large number of times. In other cases the markings have to be obtained by some mechanical method or by the use of some secret process known only to the manufacturers. This method of casting from travertine blocks gives artificial travertine an advantage over the real in that blocks to be used in this way will be all carefully selected examples, and the slabs made from them will be of a uniform high quality as regards markings and texture, whereas a wall of real travertine is likely to contain some blocks that are not up to standard in every way. Another method of producing the characteristic marks in pre-cast travertine is by putting a powdered chemical on the moulding table and pouring over it the wet cement. This causes a chemical action, and the powder effervesces, the bubbles forming holes quite similar to those in travertine, which are formed by a similar bubbling of gas. Still another method is by rolling up small "dough balls" of slightly moistened and crumbling cement or plaster and then pouring the wet mixture over it. When the slab has hardened, the dough balls which were not wet enough to cause them to set can be scraped out, and the holes they leave give a good approximation of the desired effect. The point of a trowel or a wire brush is also used to introduce markings in the surface of both pre-cast travertine and that applied to the wall in the form of plaster, with varying success, depending on the skill of the workman.

APPLICATION. Pre-cast travertine can be made in practically any thickness from ⅜ inch up. Slabs under ¾ inch may be set by plasterers and are buttered onto the brown coat plaster. Non-staining cement or plaster-of-Paris should always be used. This method is quite satisfactory, especially for smaller rooms, but the slabs applied in this manner should be limited in size, the largest dimension not exceeding 2 feet. When the slab is to be made of a thickness of ¾ inch or greater, it should be treated exactly as marble in the setting,—that is, it should be set by marble setters and anchored to the backing in every course with brass hook anchors and set with non-staining cement or plaster. In the New York metropolitan area and some other districts the setting of this material is defined in the labor union rulings, but in all cases it is best to carefully cover this matter in the specification in order to insure satisfaction. Whatever the thickness of pre-cast slabs, it is always more desirable to have them set by marble setters, as it is essentially a stone setter's problem, and ordinary plasterers are not equipped to handle it satisfactorily. Labor rules, however, in some districts prevent this being done in the case of thin slabs.

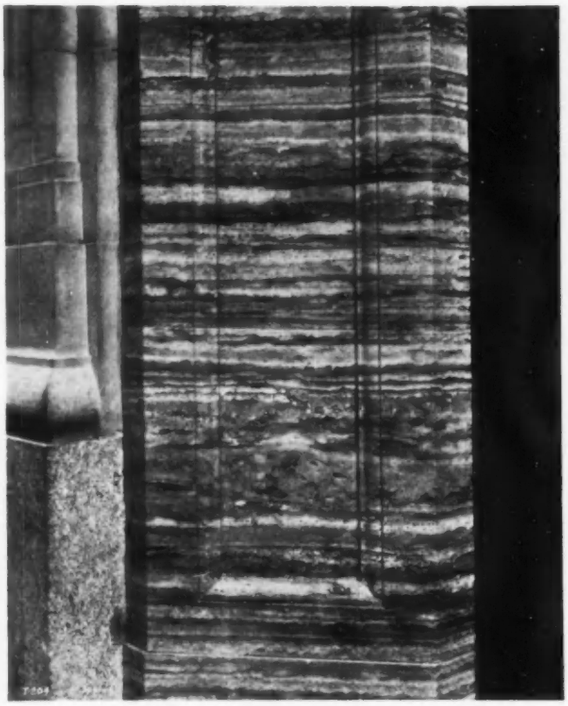
QUALITIES. The advantages of plaster work and Keene's cement are well known to all, and it will not be necessary to discuss here the quality of work done in these materials, since the same

Arch details, People's National Bank and Trust Co., White Plains, N. Y. H. P. Zoller, Architect

conditions would apply to artificial travertine made of these substances as would apply to ordinary plaster and Keene's cement work. In the case of travertine made by secret formula, the appearance of real travertine is imitated as nearly as possible. One of the principal advantages in the use of real travertine is its comparative light weight, a slab one inch thick and one foot square weighing about 11 pounds. This quality of lightness can be and is obtained in some of the better grades of artificial travertine. A high degree of sound absorption is another of the desirable qualities of travertine, and it is attained to an equal degree in some brands of artificial travertine. Resistance to stain and moisture absorption of good artificial travertine should be at least equal to that of the genuine. Most artificial travertine is not suitable to use in places where it will be subject to wear. If its use as flooring or stair treads is contemplated, the manufacturer should be required to furnish satisfactory proof that it will withstand hard usage to the same extent as will the real.

COST. As the paramount advantage of using artificial travertine is the saving in cost, a rough approximation of the relation of the prices of the several varieties of artificial travertine to that of the real is of special interest. If the material is carefully made to equal real travertine in all its important characteristics, its cost may be about 60 per cent of that of genuine stone. The range of pre-cast material of good quality will vary from 40 to 50 per cent, while the plaster work colored and treated to imitate travertine can be applied to the walls at a cost of only 10 or 15 per cent of the real stone. Of course many factors enter into the determination of cost, as for instance, the amount of carved or moulded work. On an important bank recently built in New York, a building containing a large amount of ornament, the bid for the real travertine was $69,000, and only $27,000 for high class artificial.

SPECIFICATIONS. Since artificial travertine is a material which if not properly made can result in producing very unsatisfactory conditions, a careful investigation should be made of any product that is to be used. The contractor or manufacturer should be required to guarantee it against warping, shrinking, expanding, changing color, or cracking and chipping for a period of at least a year after the work is completed. Care should be taken to specify exactly the kind of material and methods to be employed, since there is such a great variation in the quality of artificial travertine work that a general specification will be very likely to result in a low grade of work. In one specification which the writer has examined the travertine specification opened with this statement: "In general, all travertine work may be run directly on the walls or may be set up in the form of pre-cast blocks at the contractor's option." This provision would certainly allow the contractor sufficient leeway, as there is great difference in quality. Fortunately, the specification writer had included other provisions which precluded the use of low grade materials and processes. The artificial travertine contractor should always be required to furnish for approval adequate samples of the work he proposes to do and should be rigidly forced to maintain the standard set by the approved samples. Work done in place on the walls should be specified according to the best usages governing the usual plaster or Keene's cement work, with the addition of explicit direc-



Door enframement of Siena Travertine in contact with limestone and granite. 10 West 40th Street Building, New York. Ludlow & Peabody, Architects

tions as to the manner in which the surface is to be colored and the characteristic travertine markings to be produced.

Here are some provisions gleaned from various specifications, and they may be altered to fit special cases if necessary:

(1) "For walls of ½-inch material or less, the artificial travertine shall be applied with pure plaster-of-Paris (or other non-staining cement or plaster). The plaster shall be buttered over the entire back of the moistened travertine slab, which is then to be applied immediately to the backing, which is also to be moistened, and carefully lined up and plumbed. Where tight joints are required, the edges of each slab shall be buttered as it is set in place. All pointing to be be done with stainless cement.

(2) "For walls of heavier material:

(a) All artificial travertine work shall closely imitate the genuine travertine stone in texture, and the contractor shall submit samples for the architect's approval before estimating on the work.

(b) All slabs shall be set in the form of tiles with an average thickness of ¾ inch (this may be modified to suit conditions), set on a backing of non-staining cement and white sand.

(c) Return ends shall be cast on the blocks (alternating and breaking bond on each course) at all exterior angles. . . . The voussoirs and keystones of arches shall be cast in one piece the joints on soffits to carry through without cross joint. Return ends on vertical exterior angles shall not be of less than 8 inches, and in no case shall the true thickness of the slabs show on the return.

(d) There may be slight variations in the color of the individual blocks subject to the approval of the architect.

(e) The slabs shall be laid up with fine joints not to exceed ⅛ inch in thickness in setting mortar composed of non-staining white cement and white sand in the proportion of one part of cement to three parts of sand, or as may be required to work easily. The slabs are to be anchored to the backing in every course, using heavy brass wire hook anchors, all according to the best marble setting practice.

(f) The relation of the face of imitation travertine to the backing will be established on the working drawings, and in no case shall this be changed without the consent of the architect.

(g) All ornamental work shall be cast in the same material as used in the ashlar, and all shall be careful and accurate reproductions of approved models.

(h) All surfaces shall be plumb and true with all angles true right angles, and arrises clean and sharp. Horizontal joints shall line through level and vertical joints plumb.

(i) Samples not less than 3 x 3 feet, divided into ashlar, shall be submitted for the architect's approval, and the work shall not be gone ahead with except upon the basis of an approved sample, which shall be closely duplicated in color and texture.

(j) If blocks of real travertine are to be used as models, the manufacturer should be required to use not less than ten selected blocks (the number may be varied according to the size of the installation) as matrices from which to cast the artificial travertine slabs.

(3) "If artificial travertine is to be used for floors or stair treads, the voids in the surface and joints should be filled with a grout of white Portland cement. The surface may then be rubbed slightly with a dry rubbing machine. Floors should be laid on a 1-inch bed of one part Portland cement to three parts of sand over an even underfill. When the concrete sub-floor is fairly dry, the floor slabs are buttered on the underside with a thin coat of pure cement and immediately set and leveled. Stair treads are set in a similar way, except that the bed may be only ¼ inch.

A NEW PROCEDURE IN PUBLIC WORK

BY
CHARLES E. KRAHMER
OF GUILBERT & BETELLE, ARCHITECTS

AN architect commissioned to produce a building for a state, county or municipality is in effect a public servant. His duty consists in producing this building in accordance with the best legal, economic, business, constructive, engineering and artistic practices. His duty is to safeguard the interests of the public he represents. The question of public policy with its multitude of adverse interests makes the production of a building under these conditions extremely difficult. Desirable materials, methods of construction and administrative practices are very often sacrificed upon the altar of public policy. This is a condition which must be overcome, as the public interest is, or should be, always paramount. The purpose of this article is to indicate some ways in which success has been obtained in eliminating some of the handicaps imposed by these conditions.

All agents of the states, counties or municipalities are strictly governed by the laws or acts under which they operate. These laws or acts define the authority vested in the various public officials and outline the conditions which bind an architect in producing a building. The first principle in awarding a contract for public work is that the work must be awarded to the lowest responsible bidder. This requirement, which in effect ignores the relative ability, integrity and financial responsibility of the respective bidders, places a handicap upon the architect that is extremely difficult to overcome. As the award is made strictly on a price basis, there exists no reason for good will between the owner and the contractor, or between the architect and the contractor. With the element of good will non-existing, the architect's duties become extremely difficult. The normal "set-up" is: *A good client, a good architect, a good contractor, good subcontractors, and good materials equal a good building.* That is elementary. On public work we have, let us assume, *a good client, a good architect, a questionable contractor, a questionable subcontractor, and questionable materials.* That is the condition which an architect labors under in attempting to give the public a given result.

QUESTIONNAIRES. To overcome some of the undesirable features in public bidding, questionnaires have been developed. These are intended to define the responsibility of a bidder. The writer has found in his experience that these questionnaires have proved in most cases valueless, due to the fact that after they are used and the contractor rejected as irresponsible, the laws safeguarding public work in the states, counties and municipalities that the writer is familiar with allow the contractor the right of review in open court. He must there be proved irresponsible. Needless to say, this is an extremely difficult task and one which few wish to attempt. The state of New Jersey has a law which allows the state, under certain conditions, to reject a contractor if he is considered irresponsible without the right of review. This covers work executed for the state and its branches, but apparently does not apply to counties or municipalities.

SUBCONTRACTORS' LISTS WITH BIDS. In a desirable attempt to control the second questionable element, *the subcontractor,* there has been developed a practice of requiring with the bid of the general contractor the name of each subcontractor who will execute the work if this work is awarded. The theory behind this practice is to prevent the shopping of sub-bids after the award of the contract. This theory seems excellent, but in practice it has proved questionable. The weakness in submitting subcontractors with the bid is shown up in this example.

If the second low bidder had used the same subcontractors as the low bidder, he would have been the low bidder. Who is the low bidder in this case? The logical development of the principle of establishing subcontractors with the bid would be to obtain sub-bids on every portion of the work. This in effect would eliminate the general contractor, and, therefore, it appears to be unworkable under the present organization of the building industry. The writer believes the establishment of subcontractors with the bid is impractical. The establishment of all subcontractors before the contract is signed has proved to be a desirable procedure.

"OR EQUAL." Our third questionable item, that is, *materials,* brings up the question of our old friend "or equal." Public policy requires that free and open competition be had on all materials that enter into the construction of a building. There are three methods by which this can be handled.

First, the material can be specified in competition with two or three similar materials, allowing the contractor to submit to the architect at any time material which in his opinion is equal to that specified; and, if the architect approves this material, the contractor has the right to use it in place of the material called for.

The second method is to require the contractor to estimate upon exactly the material specified,

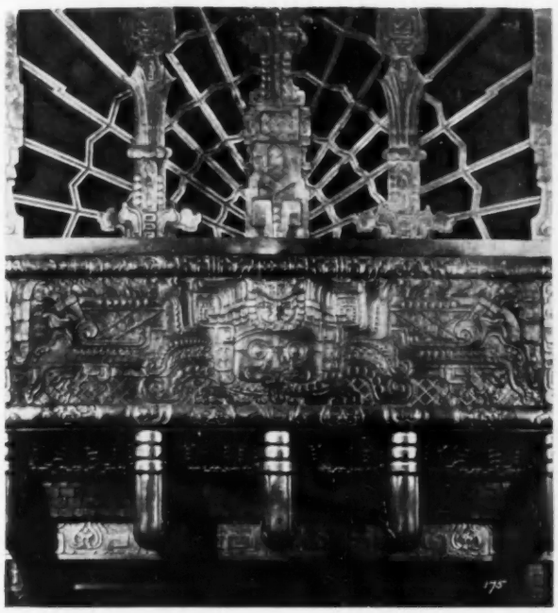
giving him the right to submit with his proposal alternative prices on any other material which in his opinion is equal to that specified, with additions to, or deductions from, the contract price. This system causes considerable confusion before the signing of the contract. It can also be used as a means of switching the award of the contract from one to another of the contractors, and in some cases it opens up the question as to whether all bids were submitted on exactly the same basis, which is one of the main requirements in public work. It is the writer's belief that this method should not be used.

The third method of handling the situation, and one in line with legal opinion, is for the architect to specify the exact kind of material that he desires, allowing the contractor to request approval on any other kind of material within a given number of days of the receipt of the bids, so as to allow the architect sufficient time to investigate the material submitted and to bulletin all other contractors, notifying them that this material is also approved. This method conforms to the policy that all bids must be made on exactly the same basis. The practical effect of this, however, is that shopping is practically eliminated, as the contractor is not anxious to save the owner any money. All he is anxious to do is to obtain an advantage over his competitors. Inasmuch as his competitors will be bulletined and will be allowed to use the same material that he has asked to be approved, it has been found that very rarely will a contractor ask approval on a material other than that specified, unless he does so as a personal favor for some materialman or manufacturer.

The writer has found that there are many items in which open bidding is desirable as protecting the best interests of the public. On these items the "or equal" clause is used, which allows the contractor to do his legitimate shopping after the contract is awarded, the architect reserving the right to judge what *is* equal. There are some items on which it is important that the exact materials specified be used. For these materials, the method of specifying the article outright is used, requiring the contractor to request approval within a given number of days of the receipt of the bids.

PROCEDURE IN OBTAINING QUALITY. The following method of obtaining quality in public work has worked with considerable satisfaction over a number of years. To get back to our original statement: *"A good client, a good architect, a good contractor, good subcontractors, and good materials equal a good building."* As the contractor, our key man, in this "set-up" is an unknown quantity, and as he receives the award on a strictly price basis in a "free for all" against all competition, without respect to his ability, experience or character, the system was reversed; so that we now have the following "set-up:" *"A good client, a good architect, good materials, good subcontractors, and an unknown general contractor, equal a good building."* To make this "set-up" work, manufacturers outstanding in their line were approached. The "set-up" was explained to them, and, realizing that the ultimate aim was to obtain quality in public work, they coöperated to the fullest extent. In specifying materials, two or three materials of a given kind were specified so that the better class of manufacturers had legitimate competition. These manufacturers furnished written assurance from their responsible officers that under no circumstances would they sell materials other than those which were specified. This blocked shopping as far as materials were concerned. The contractors and subcontractors soon found out that they could not purchase materials other than those specified, as the manufacturers frankly told them that they had written agreements with the architect to that effect.

Now we come to the subcontractor. As the architect reserves the right, and has the right, to approve or disapprove a subcontractor as capable to produce a given work, he controls this element in this manner: Through the manufacturer who sells the subcontractor his materials, a credit rating and trade rating can be obtained on the particular subcontractor proposed. This allows the architect to establish the financial standing, the kind and class of work a given subcontractor has produced, where he buys his materials, and the number of men he has normally in his employ. When this information is requested from the manufacturer, the manufacturer obtains a "lead" and in effect investigates the subcontractor before he sells him, instead of selling him first and investigating him afterwards. Under this "set-up" the legitimate manufacturer gains, the legitimate subcontractor gains, the legitimate contractor gains, the owner gains because he is assured that he will obtain exactly what he paid for, and the architect gains because it simplifies his supervision and he is able to sell the owner a superior service, inasmuch as he is in a position to assure the owner that he will obtain exactly what he paid for. This procedure allows complete control of materials and subcontractors irrespective of the general contractor. The ultimate result of this policy has been that legitimate manufacturers are attracted, legitimate subcontractors are given a fair chance and are also attracted; the general contractor, realizing under the "set-up" that there is little opportunity for the illegitimate contractor to "crash the gate," he in turn is attracted.



Polished Aluminum Spandrel in Lobby of 450 Sutter Building, San Francisco. Miller & Pflueger, Architects

ALUMINUM IN ARCHITECTURE

BY
DOUGLAS B. HOBBS

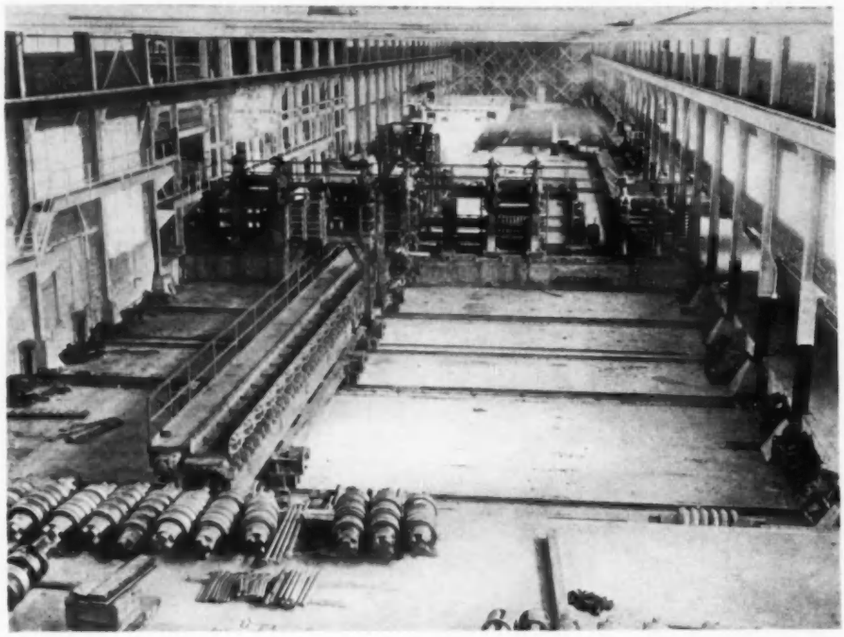
MODERN architecture is using new materials for old purposes in keeping with the thought and spirit of this generation. This is the age of simplicity, speed and lightness; the architectural trend is toward use of those materials which best express these present-day feelings. Over-ornamentation belongs to another generation. Architects are using simple, unassuming metal forms, not only in grilles, balustrades, spandrels, etc., but in mouldings and inlays and for other interior decorative effects in which simplicity is the keynote.

True, some aluminum was used in architecture in the nineties, a few short years after the present commercial process for its electrolytic reduction was developed, but principally because it was a new metal, a departure from the then-accepted standard. Its use, however, was short lived for then and during the next two decades use of brass and bronze,—the yellow metals,—held sway.

PRODUCTION PROCESSES. While Charles Martin Hall was still in school, with his mind set on discovering a process for producing aluminum cheaply, a small ornamental casting was placed on top of the 3,300-pound capstone of the Washington Monument. This was in 1884, and was probably the first architectural use of aluminum. The casting weighed only 100 ounces, yet at that time it was the largest ever produced. The metal was made by the reduction of anhydrous aluminum chloride with metallic sodium. Both of these materials were expensive, and as a result aluminum was too costly to be used on a commercial scale. However, early in 1886 Hall, an American, and Heroult, a Frenchman, both working independently, perfected similar processes for producing aluminum electrolytically. The electrolytic process eliminated the costly sodium treatment and permitted the use of aluminum oxide in place of the chloride. The ore from which aluminum oxide is obtained, is beauxite. It is found in this country in Arkansas, Georgia, Alabama and Tennessee. Some beauxite is imported for domestic use from the Guianas. Briefly the Hall-Heroult process consists of dissolving aluminum oxide in cryolite in a carbon-lined pot and passing an electric current through the mixture. With the advent of the electrolytic process for the production of aluminum, the price of the metal was reduced materially.

EARLY USES. The Venetian, Monadnock and Isabella Buildings, erected in Chicago in the early nineties, had aluminum elevator enclosures on the first floors and aluminum stair panels between the first and second floors. In 1901, a number of exterior beam casing castings were placed on the Frick Building in Pittsburgh. An examination of these early installations shows clearly the durability of the metal.

Aluminum may be obtained in plates, sheets and foil; in bar, rod and wire; in structural shapes and mouldings; in tubing, in die, permanent mould and sand castings; in screw-machine products; and in forgings. Because it can be produced in so many different forms, one problem the architects have reluctantly been forced to accept is practically eliminated. This is the use of dissimilar metals. Unless the installation is of the same material or of materials which are closely associated in the electromotive



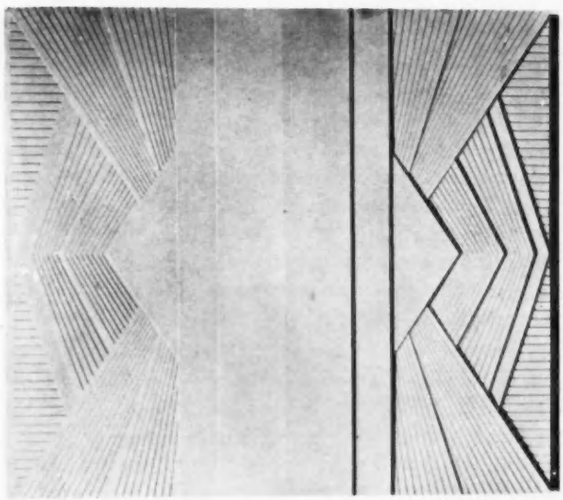
Interior of a Mill to Roll Structural Aluminum Shapes

series, electrolysis often takes place in the presence of moisture and reduces materially the life of the composite structure. With aluminum bolts, nuts, rivets, screws and nails available, the entire assembly may be fabricated from the same material, and the danger of galvanic action avoided.

WROUGHT ALUMINUM products may be formed either hot or cold. Commercially pure aluminum and the less complex alloys are more plastic than steel or brass in that they can be deformed to a greater extent without fracturing. Hence, they can be given a greater number of successive draws without requiring intermediate anneals. The workability of any metal is, of course, a function of its mechanical properties, and the different tempers of the same alloy will have different degrees of ductility.

FORMING. In the hot forming of aluminum, the principal factor to control is temperature. This, of course, varies with the shape to be formed, but in general it is the highest temperature at which the metal will retain its ductility. The standard type of steel-forming equipment may be used in the hot forming of aluminum; in fact, practically all of the hot forming of the metal has been carried out in plants normally operating on steel.

JOINING. Aluminum may be joined by welding or by riveting. Soldering is not recommended except for covering surface defects not exposed to moisture. Soldered joints have very little strength, and if the joints are exposed to moisture, electrolysis is very likely to occur. The usual methods employed for torch, spot and arc



Cast Aluminum Spandrel, Deplated. Empire State Building, New York. Shreve, Lamb & Harmon, Architects

welding are used in connection with aluminum and aluminum alloys. Butt, lap, tee fillet welds may be made on aluminum sheets. Castings may be welded either by means of a welding stick and torch or by pouring molten metal into the area to be welded.

Either steel or aluminum rivets may be employed in the riveting of an aluminum structure. Steel rivets can be driven hot in aluminum plates and shapes with the same equipment which is used in ordinary steel construction practice. Although the heat of the rivet produces practically

no effect on the properties of the adjacent material, it is often advisable to avoid localizing the heat by driving the rivets at random rather than progressively. Aluminum rivets can be readily driven, but, because of certain characteristics of the metal, the driving practice differs from that of steel. Since aluminum has a greater capacity to absorb energy, it is necessary to use a larger hammer to drive an aluminum rivet than is necessary to drive a steel rivet of corresponding size. Experience has indicated that the compression or squeeze method of riveting is best suited for aluminum.

THE MACHINING of aluminum presents no problems if the proper tools are employed. The cutting tools have appreciably more side and top rake than those commonly used for machining steel. They should have very keen edges, obtained by hand stoning with an oil-stone. In many cases, these tools do not differ from those used for machining hardwoods. Generally, aluminum can be machined to the best advantage by using high speeds and fine-to-medium feeds.

RESISTANCE TO CORROSION. Besides the ready workability of aluminum, certain other inherent characteristics of the metal make it particularly adaptable for architectural purposes. Chief among these is the resistance of the metal to atmospheric corrosion. The compounds of aluminum are colorless, thus eliminating the danger of streaking and staining adjacent surfaces. Since aluminum is resistant to corrosion, it requires no painting to preserve it. This not only eliminates the trouble and expense of upkeep, but insures against the loss of sharpness and of refinement of detail that invariably results from the filling up of ornament by successive coats of paint.

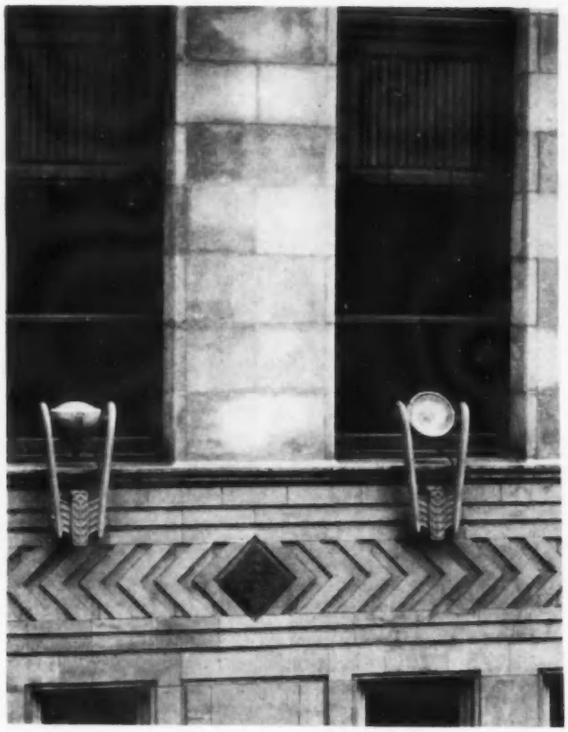
Deplated Aluminum Spandrel. City Bank. Farmers' Trust Building, New York. Cross & Cross, Architects

In color, aluminum resembles silver, but with a slightly bluish tint. On weathering, the color becomes darker. This is due in part to the protective coating of oxide which forms on the surface, and to the accumulation of foreign particles from the atmosphere. A polished surface will remain bright much longer than a rough or "as cast" surface, since the dust and dirt in the air can not collect on it as easily.

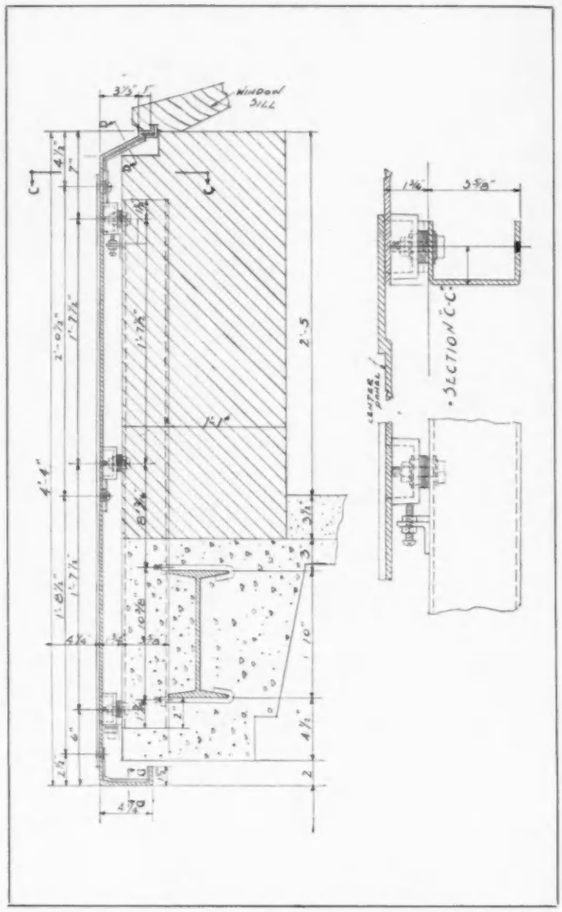
PROPERTIES. Aluminum is the lightest of all the metals used in architecture. It has a specific gravity of 2.7 (approximately .1 pound per cubic inch). Commercially pure aluminum is quite soft and ductile. Its strength is not over 10,000 to 12,000 pounds per square inch, yet by the addition of small percentages of other elements, alloys are obtained which have tensile properties ranging upwards to 60,000 pounds per square inch. The physical and chemical properties of the strong aluminum alloys commonly used in architecture are shown in Table I. The maximum properties are obtained only after the cast structure has been completely obliterated and the alloys have been fully heat-treated and aged. There are, however, other tempers besides the fully heat-treated and aged tempers; these are the annealed and the heat-treated tempers. The various tempers are designated by letters added to the alloy numbers, "O" standing for dead-soft or annealed temper; "W" for heat-treated temper; and "T" for heat-treated and aged temper.

Where maximum strength is not a requisite for the wrought alloys, commercially pure aluminum, designated 2S, 3S or 43S alloy, may be employed. In the strong aluminum alloys, the tempers depend upon the heat treatment, while in 2S and in 3S and 43S alloys, the tempers depend upon the amount of cold working. The properties of wrought aluminum and of 3S and 43S alloys are shown in Table II. The physical and chemical properties of some of the more common casting alloys are indicated in Table III.

The modulus of elasticity for practically all of the commercial aluminum alloys in both the as-cast and wrought conditions is approximately 10,000,000 pounds per square inch. Since steel has a modulus of elasticity of 29,000,000 pounds per square inch, this means that under the same unit stress, aluminum alloys will deform about three times as much as steel, provided the proportional limit is not exceeded. For the majority of ornamental aluminum castings, No. 3S alloy



Cast Aluminum Floodlighting Brackets. Merchandise Mart, Chicago. Graham, Anderson, Probst & White, Architects



Erection Drawing for Aluminum Spandrels. John Hay Commercial High School, Cleveland. J. M. Hopkinson, Architect

is employed. This alloy has a low solidification shrinkage, making it possible to cast intricate shapes having both heavy and thin sections and to obtain sharpness of detail. Spandrels, mullions, window sills, copings, roof crestings and cornices, facias, grilles, radiators and covers, statues, and many other decorative details are commonly cast in this aluminum-silicon alloy, as are some extruded parts, such as mullions, casement and double-hung windows and window sills.

Most of the sheet metal work is executed in No. 3S alloy because it has a slightly higher yield than commercially pure aluminum. Many extruded sections for doors, windows and store fronts are regularly produced in this alloy. Sheets of this aluminum-manganese alloy are generally used for cornices, marquises and shingles. For parts which receive maximum strains in service, and in which the strength of steel and the lightness of aluminum are requisites, the strong alloys, 17S, 25S and 51S, are used.

FINISHES. A number of different finishes and combinations of finishes may be obtained on aluminum ornamental castings and wrought metal products. The natural finish is that of silver with a bluish cast. However, there is a slight difference in the color of the different products depending upon the method of manufacture. The surface of a casting, for example, appears darker than that of a wrought object because of its coarser texture. On polishing an aluminum surface, the tinge of blue becomes more pronounced, and the surface has a greater reflectivity for light. Sand-blasting reduces the reflectivity of the surface, and produces a finish similar to that of etched glass. A carborundum blast gives a darker shade of gray since in this operation small particles of carborundum are deposited on the aluminum. A satin finish is obtained by wire brushing the surface or rubbing it with an emery cloth. A caustic dip merely cleans the surface. Different shades of gray may be produced by "deplating" products made from the aluminum-silicon alloys. Aluminum surfaces may be enameled or painted. As a base for paints and enamels, and since the metal does not corrode and has a pleasing color, it may serve as one of the colors in a combination color effect.

TABLE I—AVERAGE PROPERTIES OF STRONG ALUMINUM ALLOYS

Alloy (1)	Nominal Composition—%					Tensile Properties		
	Copper	Manganese	Magnesium	Silicon	Aluminum (minimum)	Yield Point (2) Pounds Per Square Inch	Ultimate Strength Pounds Per Square Inch	Elongation % In 2 Inches
17 SO	4.0	0.5	0.5		92.0	10,000	26,000	20.0
15 ST	4.0	0.5	0.5		92.0	35,000	58,000	20.0
25 SO	4.5	0.8		0.8	92.0	10,000	26,000	20.0
25 SW	4.5	0.8		0.8	92.0	25,000	48,000	18.0
25 ST	4.5	0.8		0.8	92.0	35,000	58,000	20.0
51 SO			0.6	1.0	96.5	5,500	16,000	30.0
51 SW			0.6	1.0	96.5	20,000	35,000	24.0
51 ST			0.6	1.0	96.5	35,000	48,000	14.0

NOTES:

1. The alloy numbers referred to are those of the Aluminum Company of America. The letters at the end of the alloy numbers designate the heat treatment: "O" standing for the annealed condition; "W" for the heat-treated condition; and "T" for the heat-treated and aged condition.
2. The yield point is the stress at which the stress-strain curve shows a departure of .2 per cent from the initial modulus line produced.

TABLE II—AVERAGE PROPERTIES OF WROUGHT ALUMINUM AND THE ALLOYS 3S AND 43S

Alloy (1)	Nominal Composition—%		Tensile Properties			
	Manganese	Silicon	Aluminum (minimum)	Yield Point (2) Pounds Per Square Inch	Ultimate Strength Pounds Per Square Inch	Elongation % In 2 Inches
2 SO			99.0	4,000	13,000	40.0
2 S½H			99.0	14,000	17,000	20.0
2 SH			99.0	21,000	24,000	10.0
3 SO	1.2		97.0	5,000	16,000	40.0
3 S½H	1.2		97.0	17,500	21 000	20.0
3 SH	1.2		97.0	25,500	29,000	10.0
43 SO		5.0	92.5	10,500	19,000	21.0
43 S½H		5.0	92.5	22,500	25,500	7.0
43 SH		5.0	92.5			

NOTES:

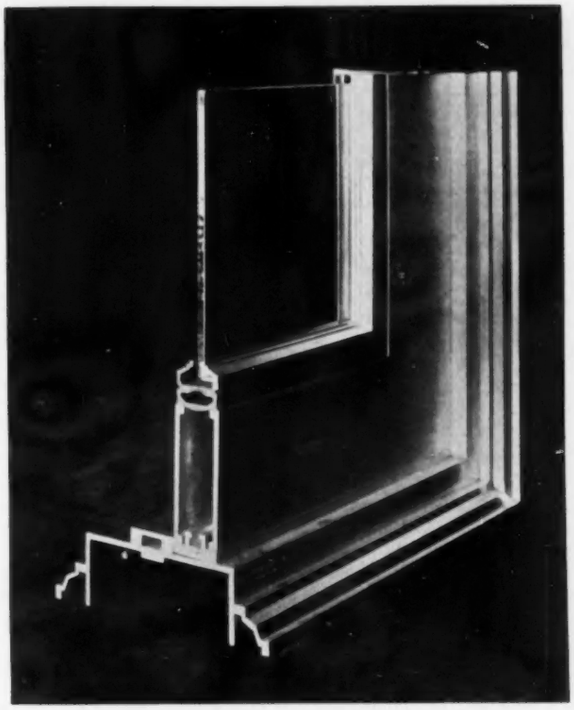
1. The alloy numbers referred to are those of the Aluminum Company of America. The letters at the end of the alloy numbers designate the temper; "O" standing for the annealed condition; "H" for the hard temper; and "½H" for the half-hard temper.
2. The yield point is the stress at which the stress-strain curve shows a departure of .2 per cent from the initial modulus line produced.

TABLE III—AVERAGE PROPERTIES OF SAND CAST ALUMINUM ALLOYS

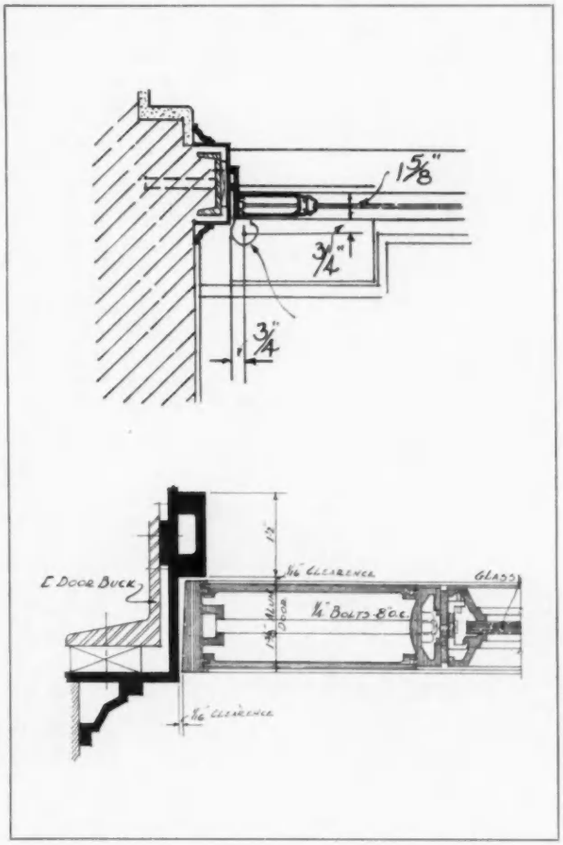
Alloy (1)	Nominal Composition—%		Tensile Properties			
	Copper	Silicon	Aluminum (minimum)	Yield Point (2) Pounds Per Square Inch	Ultimate Strength Pounds Per Square Inch	Elongation % In 2 Inches
43		5.0	92.5	9,000	19,000	4.0
47 (mod.)		12.5	85.0	11,000	26,000	8.0
195-4	4.0		93.0	16,000	31,000	8.0
195-16	4.0		93.0	22,000	36,000	4.0
195-10	4.0		93.0	27,000	40,000	2.0

NOTES:

1. The alloy numbers referred to are those of the Aluminum Company of America. The numerical suffixes "4," "16" and "10" designate the heat treatment: "4" standing for the heat-treated condition; "16" for the heat-treated and partially aged condition; and "10," for the heat-treated and fully aged condition.
2. The yield point is the stress at which the stress-strain curve shows a departure of .2 per cent from the initial modulus line produced.



Section of Door and Door Jamb Fabricated from Extruded Aluminum Moulding. Details Below



POLICY AND OPINION

LET US BE HONEST

THE element of camouflage has been a characteristic of American architecture since its beginnings. The cause can be attributed to an owner's desire to reproduce the architecture of his foreign origin or to a blind conformity to the dictates of fashion, in any event excusable only as measured by his intelligence and culture. Camouflage does not excuse the architect who understands and honors his art. On the other hand, engineering in all of its manifestations has been essentially honest. Engineering deals with the elemental forces of all kinds which are utilized to serve mankind. Simplicity and dignity characterize the engineer's art.

One function of engineering is to conduct forces from their points of origin through a stress-resisting structural medium safely to an adequate foundation. This applies to buildings and bridges. The engineers of the new Hudson River Bridge designed its massive steel towers in the most simple and direct manner. It was understood that they would be encased in a stone masonry shell designed by an architect; another example of architectural camouflage.

We are deficient indeed, if unimpressed by the majestic proportions, dignity and adequacy of these steel towers which support the cables now being spun from shore to shore. It does not require engineering knowledge to resolve the forces caused by the weight of the bridge and the pressure of the winds nor to trace the invisible stresses in their course down to the foundations. Will the Hudson River Bridge be improved in appearance if the two steel towers are enclosed in stone masonry shells that perform no structural function except to support themselves and *pretend* to support the cables? Is not the appearance of these sturdy steel towers satisfying to every reasonable æsthetic demand?

Everyone admires the proportions and dignity of the stone towers that support the cables of the old Brooklyn Bridge, the old Cincinnati-Covington Bridge and the rugged masonry towers of the Ferrenz-Aulne Bridge in Finistere. These masonry towers actually support the imposed loads. Improved methods in suspension bridge designing permit a certain flexibility in the steel towers as a feature of economy of cost and efficiency of structure. The stone tower is outmoded and its use as in the new Hudson River Bridge is a mere architectural camouflage, the cost of which can better be expended where more needed.

The steel towers of the Delaware River Bridge at Philadelphia-Camden were designed in part by Paul P. Cret, as architect, associated with Ralph Modjeski, Laurence Adams Ball and George Smedley Webster, engineers. Theodore E. Blake, as architect, was associated with Robinson & Steinman, engineers, on the new Mount Hope Bridge in Rhode Island. These steel suspension bridge towers, along with Ralph Modjeski's new towers at Poughkeepsie, are unrivaled for their beauty of design. Why, then, should anyone resort to an outmoded method of suspension bridge construction in *appearance* only, by constructing fake masonry towers and covering the beautiful, inspiring and adequate steel towers?

A. T. N.

ARCHITECTURAL CRITICS

IN a recently published essay (*The New Republic*, July 23, 1930), Professor Hook writes: "A genuine critical tradition helps *to make* creation significant; its task is not merely to recognize such creation, when once it is achieved, as a chance variation in a riot of creative action. Criticism not only makes art significant, but all life and thought as well; and American culture lacks genuine significance because it lacks genuine criticism. Its critical voices have not yet made themselves heard above the din and clack of strident self-adoration from the right, and empty denunciation from the left."

Printed architectural criticism is practically non-existent in America; it is, however, quite stridently vocal and voluminous among architects. Sporadic and superficial observation detects an unusual combination of, perhaps, brick and marble or the use of a new metal for spandrel panels of unusual design. Then the chorus of critics is heard. It is of no consequence that the structure is not one-half completed, something unusual has been done!

When the building has been enclosed and a roof termination of unusual form and construction has been completed or perhaps the building has been cut off short at a dead level with no roof in sight, the chorus of disapproval and carping comment is most vociferous. The principal objections are based on the fact that something *unusual* and non-conforming has been done. With time, they may be accepted as a fine forward step, as is the once shocking, to some, American Radiator Building. In any event, is it not better from a sense of fairness, sportsmanship and a decent regard for a man's effort, to withhold the barrage of adverse and flippant, superficial criticism until the structure has been completed, observed under all conditions of weather and light, and rationally discussed? Admitting that the style and form is unusual, it may possess great merit.—and beauty, of course, is always an individual interpretation which should be tempered with tolerance.

Can we not justly paraphrase the quotation to read: "American architecture lacks genuine significance because it lacks genuine criticism"? What would result from a genuine public criticism of architecture such as is found in the leading European publications? It would cause the uncultured parvenu owner, or the owner who has acquired a patter of alleged artistic culture, to subordinate his own half-baked and immature ideas to the dictum of an architect who has acquired the reputation of producing acceptable buildings. Criticism would cause architects properly to qualify themselves, to think twice and then make an honest creative effort rather than to be satisfied to reproduce or adapt in the all too commonly prevalent mechanical manner. First of all, we should determine whether American architecture as a whole does possess genuine significance. That is a matter for interpretation and demonstration. Is it possible to set up a system of genuine criticism, and through what mediums? Of course, genuine criticism cannot eliminate architectural mediocrity, but it certainly will recompense creative architectural ability.

A. T. N.

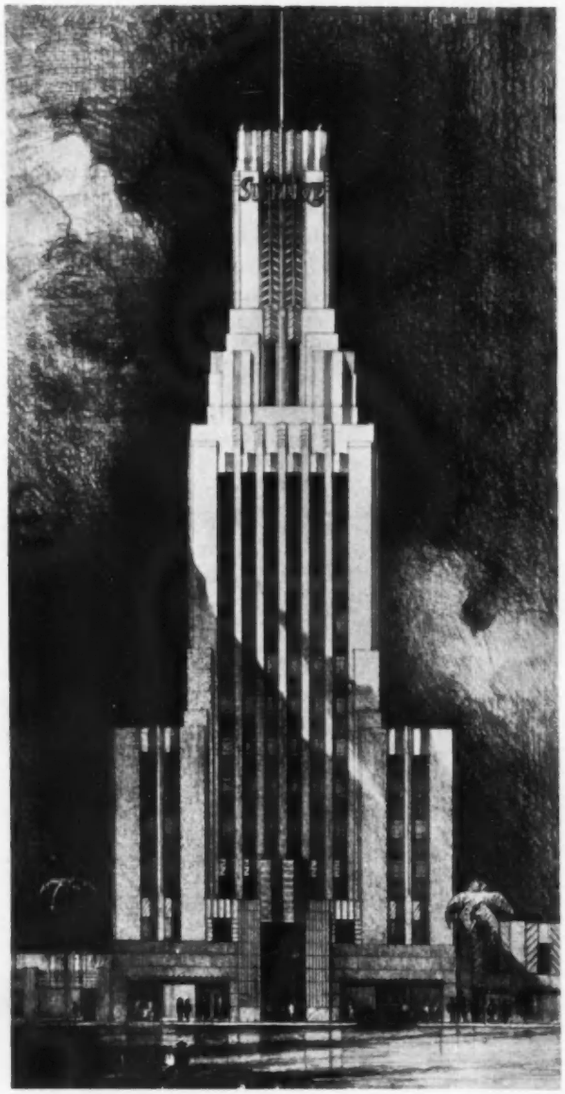
TO MODERNIZE OR TO BUILD?

BY
G. HIRSCHFELD

THE volume of business which is being done year after year in the building industry has considerably changed during the last decade, and, in general, continues to grow toward new record figures. Changed also is the position of the architect,—not because his skill is less than what it used to be; not because his art has undergone any deterioration; but rather on account of the general shifting of the economic conditions of this country. It is not the problem of satisfying the demand of the client so much as the problem of finding new demands. A decade or two ago the client or the owner of a building would seek the architect to design a new building, or to remodel or to replace an existing structure, and the architect would proceed according to the wishes of his client. But in the building industry, as in other industries with but few exceptions, supply has advanced so rapidly that the demand is not monopolizing the market. Business has to be fought for, and demand must be created.

The architect cannot afford to wait until his prospect has definitely made up his mind as to whether he should build, remodel or rebuild, but should be in a position to advise him. If new business is looked for, new fields must be invaded; in other words, the architect may have to seek the owner of property and convince him. To do this, he must know more than is usual at present. The present knowledge of the architect in general is concerned with matters of design and structure; the future knowledge will have to comprise the other factors of the enterprise. So far the architect has devoted himself chiefly to the problem of *how* to build; it seems as if he will have to study the question of *why* to build, should he desire to

A Striking Contrast Between the Concentrated Demand for Space in the Grand Central Section, New York, and, Right Next Door, Rows of Old and Obsolete Buildings Waiting for Their Turn of Increasing Land Value and Higher Rentals



The Proposed Sunfreze Building in Los Angeles Which Will Replace Two 2-Story Frame Houses

create lasting and profitable business for himself.

Many problems relating to the design are solved by economic considerations. The decision of the owner as to when and where to build or to remodel is also guided by economic planning. Both considerations, though similar in nature, are entirely different when it comes to their practical application. It is the economic consideration on the part of the owner which shall be discussed here; it is the knowledge of these economic conditions on the part of the architect that will enable him to give advice to the client, thus opening up a new field of professional activity which is bound to pay rich dividends in the future, for the architect will no longer wait for his prospect but will be in a position to exercise a certain control upon the latter's plans and intentions. When the architect shall have developed his knowledge of economic principles to such an extent that he can give sound economic advice to his client, then it will be time to speak of a sound architectural profession.

BUSINESS GETTING. The present attitude of the average architect is to "wait and see." If this is a modern business method, then the other industries must be wrong: the department store which invades private residences with invitations to open accounts; the automobile manufacturer who sells cars on installments; the whole advertising industry, which has no aim other than to get out and create customers; and all those who annually sell goods valued at $25,000,000,000 on a credit basis. They do not sit and wait, but get out on the street and look for business. Applied to the architectural profession, it means that the architect must get acquainted with the economic principles which form the basis for the owner's final decision. This survey will refer to already existing buildings and to when they should be remodeled and when replaced by new structures. It will show, to be more exact, the advantage of new over remodeled structures.

DEMAND FOR NEW BUILDINGS. It might be said that the question of remodeling or replacing has little to do with the building and more with the property. The architect, for instance, would ask: "Is the building still in good condition?", but the owner is more interested in the question: "Is there some way in which I could make more money on that same plot?" In the section around Grand Central, New York, few buildings will be found which have been remodeled since the boom in land value started. The reason is simple; land value is rising, rentals go higher, the old buildings have limited area, and even remodeling could not considerably increase rentable space. But space means earning capacity; so, new and tall buildings are being erected simply because they bring an income many times greater than that of a reconstructed building.

NO DEMAND. Take the opposite case, for instance, some of the sections of the older part of Brooklyn around Livingston and Joralemon Streets. The buildings are obsolete, and still they stay; demand for space is unchanged (perhaps even reduced); rentals are static, and the existing space meets whatever demand there is. Therefore, the best thing the owner can do is to let the building stand as it is and cash in on its present earning capacity. Here, neither remodeling nor replacing is advisable, for there are no changes in demand.

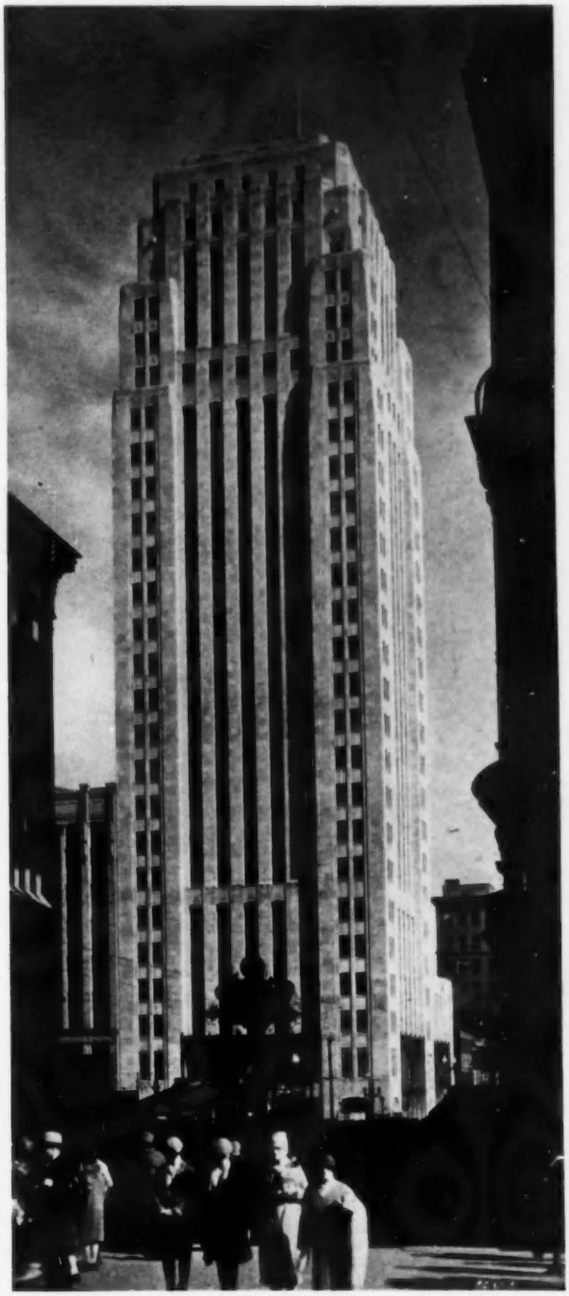
PARTIAL DEMAND. Between these two extremes is some section where a definite trend of development is not clearly visible but where business is pushing and moving,—for instance,

Broadway between Duane and Bleecker Streets. Lying between two business centers,—City Hall and Union Square,—this district, with its glorious past, is by no means at the end of its commercial development. At the present time, however, the future looks uncertain, and it must be left to each individual case as to whether it merits remodeling or whether a building should be torn down and replaced by a new structure, and this in spite of the fact that the buildings are obsolete and could very well stand some overhauling from an architectural point of view. But the latter would be without practical value. The fact remains that, generally speaking, to erect a new and tall building would involve tremendous expense, while on the other hand one cannot be sure of a real demand to fill its space. Remodeling would also cost money and would, no doubt, bring better income. However, it is very questionable whether this income increase would be high enough to justify the remodeling work. High rentals are ordinarily based on two things: increased land value and new buildings providing modern accommodations, and neither exists in the aforementioned district.

One of the best examples to prove the influence of land value upon the question of remodeling or replacing can be found in Manhattan between 30th and 50th Streets. Business expansion has been such in recent years that a great amount of space was needed in order to meet the demand. Land value rose accordingly, and so did rentals. The owners of existing buildings faced the golden opportunity to profit by this sudden demand. They could decide for either remodeling or erecting new buildings. Why in most cases they have favored the latter alternative, shall be shown later on.

SHIFT OF TRADE. The department stores which were located for many years along lower Fifth Avenue, New York, later showed a decided tendency to move to the upper part of the same thoroughfare. This is chiefly accounted for by the shift of trade in general to a more convenient neighborhood. Here is a factor well worth remembering when deciding the question of remodeling or replacing. This shift of trade is clearly noticeable in different sections of the city and has an important bearing upon the earning capacity of a building, for the newest and tallest and most spacious building is without value if the trade it caters to is located in an entirely different section of the city. A loft building would be out of place in an office district or an apartment house in a manufacturing section or an office building in a residential zone, and so on.

CONCENTRATION TENDENCY. We come now to the problem of concentration toward trade centers. This concentration movement is in intimate connection with the shift of trade, or rather it is supposed to prevent this shift. In all large cities there are concentration centers growing up. In New York one is the office center around Grand Central; another is the loft building section around the Holland Tunnel; the most important is probably the garment center between 34th and 42nd Streets. The underlying reason for this concentration tendency is neither land



In Minneapolis, the Rand Tower Replaces the 4-Story Minneapolis Club and a Small 2-Story Taxpayer. Some Years Previously, the Club Building Had Been Remodeled for Office Space, But This Was Only Temporary Relief

Concentration Tendency as Expressed in a Los Angeles District; the New Ferguson Building. Walker & Eisen, Architects

value nor earning capacity but the growth of the city in general and the subdivision into certain trade sections in particular. A city can grow uncontrolled in its sectional division to a certain limit, but not beyond it. This limit has been passed in large cities such as New York, Chicago and others, and a slow but steady contraction into trade centers is the logical consequence.

Traffic, transportation facilities and ease of access are some other factors which are influential, inasmuch as from the higher land value which they create there originates partly the necessity of either remodeling or replacing an obsolete building. The new subway (Municipal Line) which will be constructed within the next few years will tremendously increase land value along Eighth Avenue, and most of the owners of buildings will take this increase with the accompanying rise in rentals as a fine opportunity for increasing the earning capacity, be it by way of reconstruction or of replacement by new structures.

ECONOMIC PRINCIPLES. Thus we always come back to the value of the land, which has the final word to say. Most of the time it is demand for space which drives the value of the property up and up; it should only be added that demand for space in turn is caused by the different circumstances just explained, shift of trade, concentration movement, accessibility, traffic and transportation facilities, and other factors. The architect must take into consideration these economic factors if he wants business, for they are the guiding principles behind the owner's projects, and to anticipate them means to improve his chance of obtaining the contract. Today the majority of owners or prospective owners are getting their advice from the real estate people because they want to sell. The architect's interest should not be less intense; if the realtor wants to sell, the architect wants to build; if one is anxious to get rid of certain properties, the other is just as anxious to obtain the owner's confidence, i.e., his contract. The fact remains that the architect has to adopt (out of shrewd business sense) the interests of his client, and even before he becomes his client. If the man from the real estate ranks talks business with his prospect, there is no reason in the world why the architect cannot put his activities on a business basis. More than one of the outstanding and truly successful architects have adopted business methods without prejudice to their work as artists.

REMODELING. It has been explained what circumstances raise the question of remodeling or replacing an old and obsolete building. While remodeling has certain advantages, there are disadvantages also. We have seen that land value is the real factor behind building development, and right here lies the grave point of danger, for remodeling can only change the building more or less superficially, while land value may change the whole aspect within a couple of years. Take some building in a section of rising value,—for instance, the former Lorraine Hotel at 545 Fifth Avenue. While many changes have been made, thus justifying better rentals, as a whole space has not been increased nor has the earning capacity increased to such an extent as to keep pace with the rising value of the land along Fifth Avenue. It seems, therefore, safe to say that within a reasonable time the property value will have risen so high as to demand the construction of a new building with sufficient space to meet the demand. In other words, remodeling by its very nature is of only temporary value as long as the value of the property is rising.

This characteristic of a temporary project in remodeling is not limited to the building itself but is often related to the character of the immediate neighborhood. Generally speaking, it is of little use to remodel an apartment building in the gar-

ment center, for the chances are that soon additional space will be required by the garment people, and then the apartment house must give way. However, as long as the sectional change is not completed, as long as there is no way of saying whether this particular district is definitely going to be an apartment center, an office district, a loft section or a manufacturing division, it is advisable to remodel obsolete buildings if thereby the earning capacity can be increased. The construction of a new building in one of the aforementioned instances would definitely establish the character of the structure and would, later on, leave no chance of changing it according to the eventual change in the character of this section. The *Pictorial Review* building on 39th Street and Seventh Avenue, New York, was only seven years old when it had to be torn down, partly because trade had shifted in that time and partly because its earning capacity had fallen far behind the gross rental obtainable on the basis of the greatly increased property value.

Another reason why remodeling pays only in exceptional cases is that space cannot be created (generally speaking) by the reconstruction process; and space is the most valuable asset in building construction. Besides, economic considerations such as accessibility, light and air, traffic facilities, etc., can only occasionally be taken into account. There are cases, however, where remodeling is the wisest thing to do. The former Belmont Hotel, now the "Peerless," on 45th Street, had two front apartments on the ground floor which brought in only small revenue. The building has been remodeled, and the ground floor converted into stores, whereby the rental of this floor has been multiplied by four. In the upper 70's in Manhattan there are some brown stone dwellings which have been remodeled, converting each floor into one or two apartments. The change of this neighborhood is not yet completed; it is not profitable as a section of small dwellings nor is it ripe for large apartment houses. The sensible thing to do is to wait and just use the time for bridging between the past and the future development. Remodeling as a temporary measure is an excellent way out of temporary problems, and it is therefore estimated that a remodeled building should pay for the outlay within three or five years.

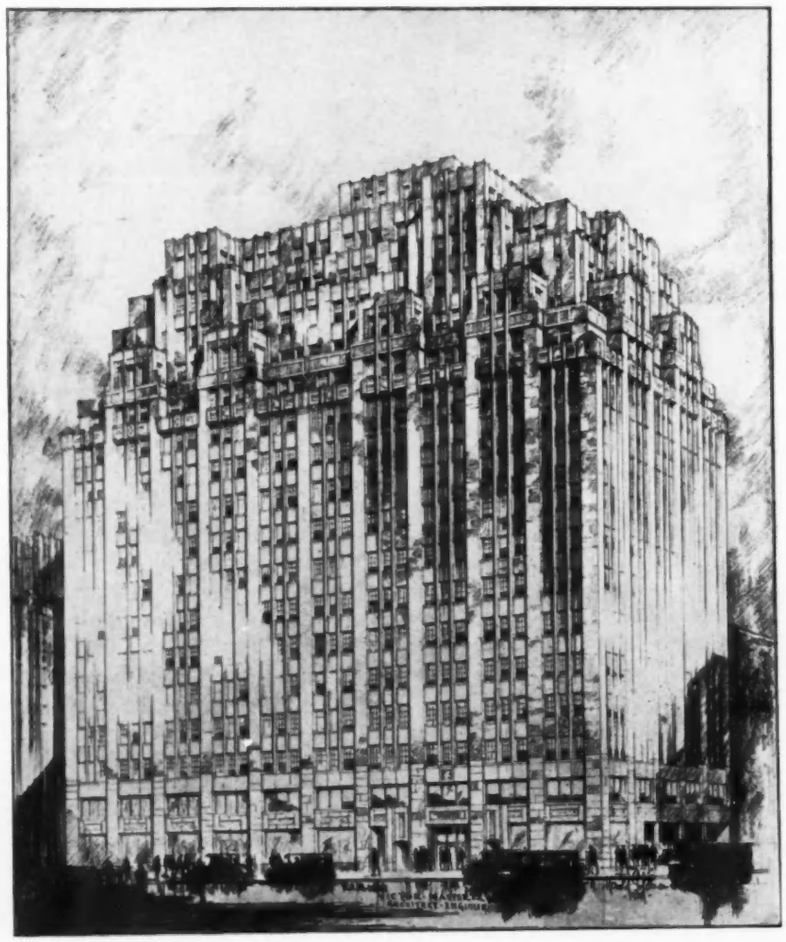
NEW BUILDINGS. The chief advantage of new structures over remodeled buildings lies in the fact that it will be in precise accordance with the possibilities growing out of the value of the property. All the economic principles which can be traced back to demand for space, trade conditions, traffic, transportation, etc., can be considered in the new structure, thus allowing for the highest possible exploitation of earning power according to the prevailing circumstances. The ground floor space can be doubled by keeping the height of the floor down to 13 feet or even less and giving the second and perhaps the third floor a margin of 22 feet, the first floor being reserved for brokers and retail stores and the second being occupied by a bank, thereby also doubling the high ground floor rental. Besides, a new building can be constructed in such a way that after a number of years it can be used for a different purpose. Some of the loft buildings around Varick Street have been built so that they can easily and with little expense be converted into office buildings. In this case the building facilities are put at the center; true, ground floor space is being sacrificed, but considerably more space is saved in the 20 or 30 stories above.

"Land Value is Rising, Rentals Go Higher." Edison Building, Los Angeles. Previously the Site Was Used for Parking Space

BUILDING AS BUSINESS. The trend of modern building development is, no doubt, toward the tall building, and rightfully so. The question as to whether remodeling or rebuilding is preferable is not one of the building itself, but one of profit. If the architect wants to exercise a certain control upon building activities (and only such con-

trol can obtain for him valuable contracts), he has to look at the matter from the business point of view. The man who controls the building industry, as well as building development, is the owner, no matter whether he is a speculator or an investor. The architect has to subordinate his interests to the owner's financial, or rather material viewpoint. So far the average architect has been very careful indeed not to step out of his bounds. In fact, he has not only not stepped out but he has secluded himself in his strictly artistic atmosphere. But how does he reconcile his attitude with the modern building development? Building is no longer a matter of art but a matter of area. The fundamental question is not how to erect buildings of great artistic excellence, but how to erect profitable buildings, i.e., buildings at the least possible expense, with the largest possible space.

It is surprising to see how many an architect has held aloof from business methods when it is considered that no one should be more interested in creating new space, in replacing old buildings, in furthering modern urban development, than the architect himself. Who builds the new structures, lofts, skyscrapers, apartment towers and the like? Who is the modern city builder? The owner? Or the real estate man? By no means! And yet, in the hands of these two lies the control of actual building development. The architect who bears the responsibility and gets the contract sits idly by. True, there are a few architects who go out and talk to owners and give advice and get the contracts before anyone else even hears of the pending projects, but it is a fact that the great majority of architects just fulfill their professional duties as their fathers and forefathers have done,—basking in the sun of artistic intuition. If our great industrialists were sitting and waiting for orders, the United States would not be where it is,—neither financially nor commercially nor industrially. It is up to the architect to follow this modern industrial leadership.



The Graybar-Varick Building, New York, Victor Mayper, Architect; So Planned That It May Be Used for Loft or Office Purposes to Correspond With the Economic or Trade Changes in the District

THE SUPERVISION OF CONSTRUCTION OPERATIONS

BY
WILFRED W. BEACH

CHAPTER 18—CONTINUED; MISCELLANEOUS METAL WORK

AS to the materials entering into the construction of articles of miscellaneous metals, we find, to begin with, that nomenclature is needlessly loose in general practice. For instance, one finds steel angles referred to as "angle irons," and the terms "brass" and "bronze" used more or less interchangeably. Where steel is called for in this division, it is supposed to conform to the requirements for structural steel described in the preceding chapter. Although no inspector can detect the finer variations in pig iron products (subjects for laboratory tests), he should know, in a general way, the differences between steel and the various forms of iron. Quoting from the Century Dictionary, these are "(1) *cast iron,* which is hard, comparatively brittle, and readily fusible, and cannot be forged or welded; (2) *wrought iron,* which is comparatively soft, malleable, ductile, weldable, and fusible only at a very high temperature; (3) *steel,* which is also malleable and weldable, but fusible, and,—what is of great importance,—capable of acquiring, by being tempered, a very high degree of hardness, so that it cuts wrought iron with ease. By the processes ordinarily followed, wrought iron and steel are made not directly from the ore, but from iron which has been smelted in the blast furnace or that has the form of cast iron. The name *cast iron,* however, is ordinarily given to iron which has been re-smelted in the cupola furnace and cast in any form desired for use. . . . *Malleable iron castings,* or (as more generally called) *malleable cast iron,* is cast iron de-carbonized by packing it with oxide of iron and subjecting it to the temperature of red heat for several days. Iron thus treated and carefully cooled may be bent considerably without breaking and is malleable in a slight degree."

A superintendent does not seriously concern himself as to whether or not wrought iron or steel has been used in the make-up of balustrades, railings and similar ornamental work for which either material is specified. He ascertains that details have been faithfully followed, in the medium best suited to the purpose, which is as far as he need go. In the matter of cast iron, however, he must be more careful. Different foundries may vary widely as to their practice in the use of admixtures of junk metal with their pig iron, as well as in the care in making the moulds and pouring the flux. Specifications for cast iron vary in the perfection demanded, depending upon the purpose of the member. Greater refinements of modeling and finishing are demanded for ornamental work; better chemical constituents for columns, baseplates and similar members subjected to special loadings. An experienced inspector can satisfy himself superficially, by visual inspection, as to the general characteristics of such castings, but he must have chemical analysis of the pouring, if he is to be sure of the composition. This is so inconvenient and the composition of cast iron so unequal and uncertain, that it is seldom used under severe conditions of heavy loadings, except with a high factor of safety. Another feature of structural castings, one that can and must be watched by the inspector, is the thickness of the metal, especially throughout large areas. Variations in thickness of from ¼ to ½ inch have been detected in the shells of columns supposed to be uniformly ½ or ¾ inch thick. For purposes of inspection and measuring, cast iron columns should be designed with open ends or with small test holes cast in the shells at intervals. Both columns and base plates should have turned bearing surfaces, except for light loadings.

At one time, it was customary to delay stair setting until toward the finishing of a building, and to install temporary stairs for use during construction. But with the increased use of substantial steel stairs, one sees them installed as rapidly as the progress of other work will permit, and their free use by all mechanics deemed a matter of course. Treads may be either of checkered steel, slate, marble, or a composition, such as concrete or terrazzo, into which anti-slip aggregates are mixed, or dusted and troweled. For such stone or concrete treads, the stair framing is suitably depressed and fitted with steel angles or plates, on which temporary planking is attached during the construction period. Platforms and other landings should be similarly cared for until time to apply the finished treads and floor surfacings.

Exterior stairs and fire escapes that come under this heading must be watched as carefully as those inside. In all cities, and in some states, fire escapes are required for certain types of buildings and must conform to code specifications. The superintendent must know if these apply to his work, and, if a public inspector has jurisdiction, see that he is notified and that the contractor secures a certificate of inspection and approval of everything in which such an official is concerned.

Bronze and brass are metal alloys used to a large extent for decorative features of buildings, such as tablets, grilles, railings, sash-frames,

hardware, etc. They may be cast, rolled, drawn or extruded. (Sheet bronze and brass will be treated of in the chapter on Sheet Metal Work.) Chemically, there is much variation in each of these materials. Bronze is from 70 to 95 per cent copper (usually about 85 per cent) and the remainder tin, though some bronzes contain small amounts of zinc, lead or aluminum. Phosphor bronze is an alloy rendered exceedingly hard by the introduction of less than 1 per cent of phosphorus. Brass contains from 60 to 90 per cent of copper and the remainder zinc, with an occasional admixture of small percentages of tin or lead, the usual proportion being 2/3 copper and 1/3 zinc. There are government standards for all these various alloys, which standards are frequently mentioned in architects' specifications. However, inasmuch as few architects call for chemical analyses, or even dependable proof, of the constituency of either bronze or brass, the superintendent has no recourse but to accept the statement of the producer as to what is being supplied. This means that he must either insist that such purchases be made from a concern of known dependability or he must take his chances with substitutes. In the latter event, the architect might save money by specifying "commercial" grades, thus allowing the foundry or mill to supply its regular product. Inspection of these materials is thus, of necessity, confined to the degree of excellence of the workmanship and to the comparison of finishes with those of approved samples. Such finishes are applied equally well to plated work, such as is sometimes used for counter grilles in offices and the less expensive banks. Occasionally, a superintendent will discover that members that should be solid bronze or brass are, through oversight or dishonesty, actually plated steel. Such substitution is easily detected by the application of an ordinary magnet which will adhere to steel, but which has no attraction for bronze or brass. This test should be applied to various members, as it is quite possible that only the heavier parts are of steel, and that others conform to the specification demands.

Ordinary sash bars for store fronts are generally designed in accordance with the details as shown in the catalog of some particular manufacturer, "or approved equal," the material being drawn or extruded bronze in natural color. The architect must determine whether or not a suggested substitute (if any) is to be accepted and must pass upon the details submitted. The superintendent must see that the material delivered is in accord with such details, or those originally shown, and that it is installed as the makers intended, substantially secured in place, and with all rebates and connections so formed as to make perfect receptacles for the glass; with due allowances for setting, condensation and drainage. More elaborate sash frames are detailed with members of cast or rolled bronze or iron. Some of these have all the refinements of the most ornate doors, gates and grilles and must be made to conform to full-sized details and models. The same is true of bronze tablets, medallions, etc., all of which are subjects for the mature judgment of experts.

Nothing in connection with building operations is of more importance than the anchorage of one material to another, yet nothing is so easily slighted by the artisan,—or so frequently overlooked by the inspector. Carelessness in this particular is one of the first things manifest in the deterioration of a building. Members that should be rigid work loose for every conceivable reason,—or for no apparent reason, as is the case with many individual bronze letters used for exterior signs. It thus behooves the superintendent to give particular attention to this matter in every instance. The need of extra care in the case of wall rail brackets has already been mentioned. Such precautions should be applied also to the attachments of all pipe railings and similar members. The posts should be grouted into sleeves cast into the concrete, wherever possible. Elsewhere nothing but the most effectual bolting should be held to suffice. Corner guards and thresholds are likewise likely to leave their moorings, and hence need special attention.

The superintendent should check up his thresholds (sometimes termed "saddles") early in the proceedings. These may vary to a considerable extent throughout the building. Present custom is to use them only in doorways where a change in floor material occurs, the old time wood "carpet strip" being seldom used. Thresholds must be of full length and correctly located in reference to the door above, as well as rigidly secured. Some drawings are vague as to which doorways are so equipped, and the uncertainty should be cleared up before orders are placed.

The question of location of access doors in relation to concealed valves and other operating conveniences also demands forehandedness. These are sometimes located tentatively on drawings, sometimes merely specified in quantity, to be located entirely according to the judgment of the superintendent. He must consult with the contractors for the pipe trades and make sure that nothing needing access is left out of reach, though he has to requisition more doors for the purpose. Bucks for such doors and for register openings and the like must be set and anchored with the same care as those for larger openings.

(*To be Continued in the October issue of* THE ARCHITECTURAL FORUM)